RAILROAD GAZETTE

FRIDAY, SEPTEMBER 7, 1900.

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Contributions

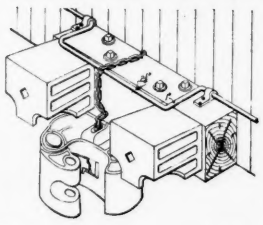
Coupler Unlocking Gear.

Easton, Pa., Aug. 8, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I notice the editorial in your issue of Aug. 3, in relation to the unlocking gear of the M. C. B. couplers, and the inspection which was made for the Interstate Commerce Commission, and call your attention to a device which would remedy most, if not all, of the defects which were found in the cars examined. I agree with you in your statement that it can not be remedied by any lock set or device within the coupler and that it should be simple and strong.

The principal reason for the chain becoming too long is the working loose of the brackets or keepers; and breaking comes about because they are in many cases too light. What is required is a ½ in. or ⅝ in. chain to be attached directly to the car with an eye bolt or hook lag screw and not to the unlocking lever. This, too, will prevent the handle of the lever from being bent, and the brackets from becoming loose. The projection on the lever is often bent by the draft rigging becoming slack and pulling the coupler out too far, thus making the chain too long. The bail on the lever of the Acme device answers two purposes; as it lies down on the buffer block and extends but a short distance over it, it is not so liable to be bent as the single projection with the eye; it also can be used for all couplers without reference to the location of the lock and can be made uniform for almost all cars, thus making it standard for repairs.



This device has other advantages besides those mentioned, viz.: all the couplers in service can be unlocked automatically when the draft rigging gives away, and as the attachment to the car is strong and substantial it will prevent the coupler dropping on the track. It is also strong enough to support the head of the coupler if it should be broken off, which frequently happens.

It was decided at the late M. C. B. convention to submit to letter ballot, the extension of the unlocking lever all the way across the car. When this is done it would add but little to the expense to make this application.

T. L. MCKEEN.

The Relative Economy of Stationary and Locomotive Steam Plants.

Lansingburgh, N. Y., July 24, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I note with much interest your article "Two Power Plants, Each of 1,000 Horse-Power Capacity." [*Railroad Gazette*, July 20, p. 494.]

It would be a matter of great interest to all persons engaged in the construction and operation of power plants if the subject could be pursued and analyzed in regard to the relative economy, including interest and depreciation, of the two types of power development. I presume this analysis will show how the locomotive boiler will not develop 1,000 h.p. capacity continuously. It is said a locomotive blocked up from the ground will not develop anything like its rated capacity as a stationary engine.

I have been for many years engaged in the business of steam plants for electric lighting and electric railroads and have found that most of the plants designed for these purposes have been designed for a theoretical rather than a practical economy. All sorts of steam wasting devices are introduced with no better excuse than that of a habit or the convenience of some employee, whose time has to be paid for in any event, and generally speaking, with very little regard for the commercial economy of the plant and the almost invariable neglect of the fact that times are changing rapidly in power development as in anything else and that, in addition to interest and depreciation, replacement of the entire plant is almost certain to occur once in ten years, so that what may be the most economical plant in operation may be far from the most economical ultimately.

J. A. POWERS.

[Comment on this subject will be found on the editorial pages.—EDITOR.]

Locomotives at Paris.

In the September number of the *Engineering Magazine* is the first of a series of articles by Mr. Rous-Marten on the locomotives shown at Paris. Mr. Rous-Marten is a studious observer of locomotives, particularly British and Continental, and his notes of what he has seen at Paris are sure to be interesting. Below we give extracts from his first paper.

For it is a splendid show—there can be no two opinions about that. So great and varied a collection of fine locomotives and vehicles can hardly have been brought together ever before. And assuredly there has never been any previous exhibition which displayed so imposing an array of giants among locomotives.

The points which strike one most forcibly are:

(1) The enormous preponderance of the compound type of engines over the simple high-pressure type.

(2) The comparative scarcity of eccentricities in design.

(3) The immense increase in size and weight of locomotives since the last exhibition.

(4) The specially huge size and power of certain Russian engines.

(5) The almost universal employment of coupled wheels in express engines, and the consequent all but complete disappearance of the single-driver type.

(6) The large augmentation of heating surface and of steam pressure.

These were the points which struck me most in my general survey of the exhibition. On the whole, they represent the principle of development in locomotive practice. They tend in the direction of increased haulage power, rather than in that of any attempted addition to existing possibilities in respect of maximum speeds. It is doubtful whether any locomotive shown at Vincennes has a much higher capacity in respect of mere speed than had the Great Western engine with 8-ft. single driving wheels, designed by Sir Daniel (then Mr.) Gooch and shown in the London exhibition of 1851, or than the 8-ft. single-wheeler shown by Messrs. Neilson & Co., of Glasgow, eleven years later. At all events, if any of the most recent engines have higher speed capacity, this is due solely to the increased steam pressure employed and not to any other modification of design. This is particularly noticeable in the case of the locomotives built for service on the European continent where maximum speeds are limited by law. There must be no attempts to attain 90 or 100 miles an hour, as in America and Great Britain, save in special experimental trials expressly authorized and fenced round with elaborate precautions. All over Germany and Belgium, and, I believe, also in Holland and Austria-Hungary, the maximum speed is rigorously limited to about 56 miles per hour. I understand that a similar restriction exists on the Etat Railway of France and it also does—or did until very recently—on the French Western line. For a long time the Chemin de Fer du Nord stood alone in France in being permitted to run at 74.5 miles an hour, but this is now sanctioned also on the Orleans, Est, and Midi lines. The Orleans Railway was limited to 70 miles an hour, up to a little more than a year ago, and the Paris-Lyons Mediteranée 62.1 miles an hour. I believe that on the latter railway this limit has lately been extended, and on the Nord line a speed of 77.6 miles may be run on special occasions by direct permission. But the principle of restriction holds good over the entire European continent.

Indisputably the chief exception offered by England to the rule of modern locomotive practice as exemplified at Vincennes is that of the Midland exhibition engine, which is the sole instance of a single-driver engine among all that crowd of express engines present. Even among the four locomotives of purely English design, which, I regret to say, constitute the entire display in the British section, this Midland engine, "Princess of Wales," No. 2601, is the sole single-wheeler.

It is a curious feature in this problem that the sole representative of the once-universal single-driver type for express duty is designed by an engineer—one of the most eminent in England—who for many years, in fact up to the year 1885, set his face utterly against the use of that type in any circumstances or under any conditions. Mr. Johnson continued to build nothing but coupled locomotives for that fast express duty, although his trains were timed quite as fast as those worked by single-wheelers, and in some cases even faster. When, by the introduction of the Gresham sand-blast, slipping was reduced to a minimum, Mr. Johnson brought out a new type of single-wheelers, which, although it has undergone five successive developments, of which the latest is to be seen in the beautiful engine at Vincennes, yet remains the same in all but relatively minor details. Nos. 25-29, the earliest numbers of the now numerous class, had 18-in. cylinders, 26-in. piston stroke, and 7 ft. 4 in. single driving-wheels. No. 1853—prize winner in the Paris Exhibition of 1889—and her sister-engines, had 18½-in. cylinders and 7 ft. 6 in. wheels. No. 79, etc., had 19-in. cylinders; No. 115, etc., had 19½-in. cylinders and 7 ft. 9-in. wheels, and finally No. 2601, with the same sized cylinders and wheels, has a larger fire-box, higher steam-pressure, and a double-bogie tender. But the type is the same, persistent throughout. Thus the fact that Mr. Johnson brings out in 1900 a new development of this type must at least be accepted as evidence that one of the most eminent of British locomotive engineers does not regard the single-driver type as archaic or obsolete, but, on the contrary, sees in it a potentiality of much continued usefulness if employed upon work suited to its special idiosyncracies.

Nor does he stand alone in this view, if one may judge an engineer's principles by his actions, for Mr. H. A. Ivatt, the able chief mechanical engineer of the Great Northern Railway, who, like Mr. Johnson, has built and continues to build large numbers of fine express engines with coupled wheels, has quite recently turned out two remarkably excellent specimens of express single-wheelers. So has Mr. Harry Pollitt, Chief Mechanical Engineer of the Great Central line. [See *Railroad Gazette*, July 27, for illustrated description.] Had the Great Northern and the Great Central companies cared to exhibit at Vincennes, it is highly probable that they would have sent their latest single-wheelers as their newest and most interesting types.

But, on the other hand, there is the adversely significant fact that the Great Eastern, which has been one of the three most consistent votaries of single-wheelism since its earliest days, and whose present able locomotive superintendent, Mr. James Holden, brought out only two years ago an entirely new single-driver type, is represented this year at Vincennes by a coupled express engine—a magnificent one, too. And, further, Mr. Holden himself informed me that on mature consideration he did not intend to build any more single-wheelers. It is an interesting coincidence that the last time I met Mr. W. Dean, Chief Mechanical Engineer of the Great Western Railway—a line which has never hitherto wavered in its preference for the single-driver type in express service—he informed me that, in view of the performances of his latest coupled type, he too would construct no more single-wheelers.

A second prominent exception offered by Great Britain to the tendency of the whole world outside her boundaries, consists in her disinclination to adopt the compound principle for locomotives. Of the four purely British exhibits, only one is constructed on the compound system, the engine "La France," No. 4000, built at Crewe. All the rest are non-compound. Among the exhibits of all other countries, the proportion of compounds to non-compounds is, I should think, quite 10 to 1, if not more. This strange discrepancy in national practice raises another question, and a large one, which I must leave to be dealt with later.

Meanwhile, pursuing my plan of noticing first, in my general review, the prominent exceptions to prevalent locomotive practice, I must mention two engines of a most extraordinary character which I am unable to treat fully on this occasion, but which I hope to describe and illustrate in a subsequent article. One of these is so singular in the salient feature of its design that, had not the idea been indignantly repudiated by its designer, one would have felt impelled to regard it as a huge scientific practical joke. It is a four-coupled compound express engine built by Krauss, of Munich, for the Bavarian State Railways. It may be described as quasi-"Atlantic" in its type, having a small pair of carrying wheels behind the fire-box, two pairs of large coupled driving wheels and a four-wheeled leading bogie. The cylinders are inside, but that is a mere detail. The astonishing peculiarity of this engine is that its two pairs of bogie wheels are placed so far apart as to admit between them a third pair of wheels, 3ft. 3¾ in. in diam., and that this third pair is driven by a pair of small outside cylinders, the combination producing what is called an "auxiliary" engine—equivalent to the "donkey" on board a steamer. Further, this pair of small auxiliary drivers can be raised from the rails, or pressed upon them, as desired, by means of a lever. The object of this eccentric appliance has proved a tough puzzle to most visitors. The designer explained that his "real intention is to have a locomotive, which, in general, has the qualities of a four-coupled engine, but is able to increase, every time it is needed, its cylinder power as well as its adhesive weight in the proportion of 3 to 2, so that it can exert temporarily a tractive power corresponding to six-coupled wheels. In such cases, viz., in starting and accelerating heavy trains, or in ascending steep gradients, the auxiliary axle can be pressed down, its cylinders switched in, and the small engine used as a pilot for the main one. As the assistance of the auxiliary engine can only be wanted at a limited speed, the diameter of its drivers can be made considerably smaller than that of the main drivers."

The other locomotive which struck me as prominent among the relatively few eccentricities of design was the

huge six-coupled express engine built at the Florence Works of the Adriatic Railway of Italy, and numbered "3701." Practically it is a six-coupled express bogie engine which has the four-wheeled bogie at the trailing instead of the leading end. But what would be the trailing end of the engine, according to the usual practice, is treated as the leading end in this instance. That is to say, the engine runs fire-box foremost and smoke-box behind, and the cab is closed in with a prow-shaped end containing six large windows. But, it will be asked, where does the engine carry her supplies of water and fuel? That is a question whose authoritative settlement must be postponed until a later article. For the present I must content myself with observing that coal bunkers of considerable size are fitted on both sides of the fire-box and foot-plate, while the smoke-box end of the engine —I cannot call it the "front" in these circumstances—is followed by a very long cylindrical tank mounted on a six-wheeler frame. In the rear of the tank is a second, but smaller, cab. The whole aspect of this vast but eccentric locomotive is such as to inspire puzzled amazement amounting almost to awe.

Another point which struck me as singular in connection with the locomotive exhibition was that an engine built by Messrs. Burnham, Williams & Co., at the Baldwin works, Philadelphia, for the Great Northern Railway of England, is shown in the British section as an exhibit of the Great Northern Railway Company. In this connection, it is noteworthy that the engine, "Koningin Wilhelmina," which was built by Messrs. Neilson, Reid & Co., of Glasgow, for the Dutch State Railway, is expressly shown as a British exhibit and not as a Dutch one.

One of the most remarkable locomotives in the entire Exhibition is the great four-cylinder compound, four-coupled, 10-wheeled express engine of the "Atlantic" type, No. 2642, designed by M. du Bousquet, Chemin de Fer du Nord, on the de Glehn compound system, and built by the Société Alsacienne de Constructions Mécaniques, at Belfort. It is shown by the Nord company and the exhibitors have adopted the exceptional course of having two duplicate engines built, absolutely identical in every particular, the one being on show at Vincennes, while the other is exhibited to the public oustide in actual work on the very fast expresses on the Nord line. This novel plan struck me as remarkably effective and impressive in view of the superb work accomplished by the running engine of the two sisters.

Revision of the Weehawken Yards—New York Central.

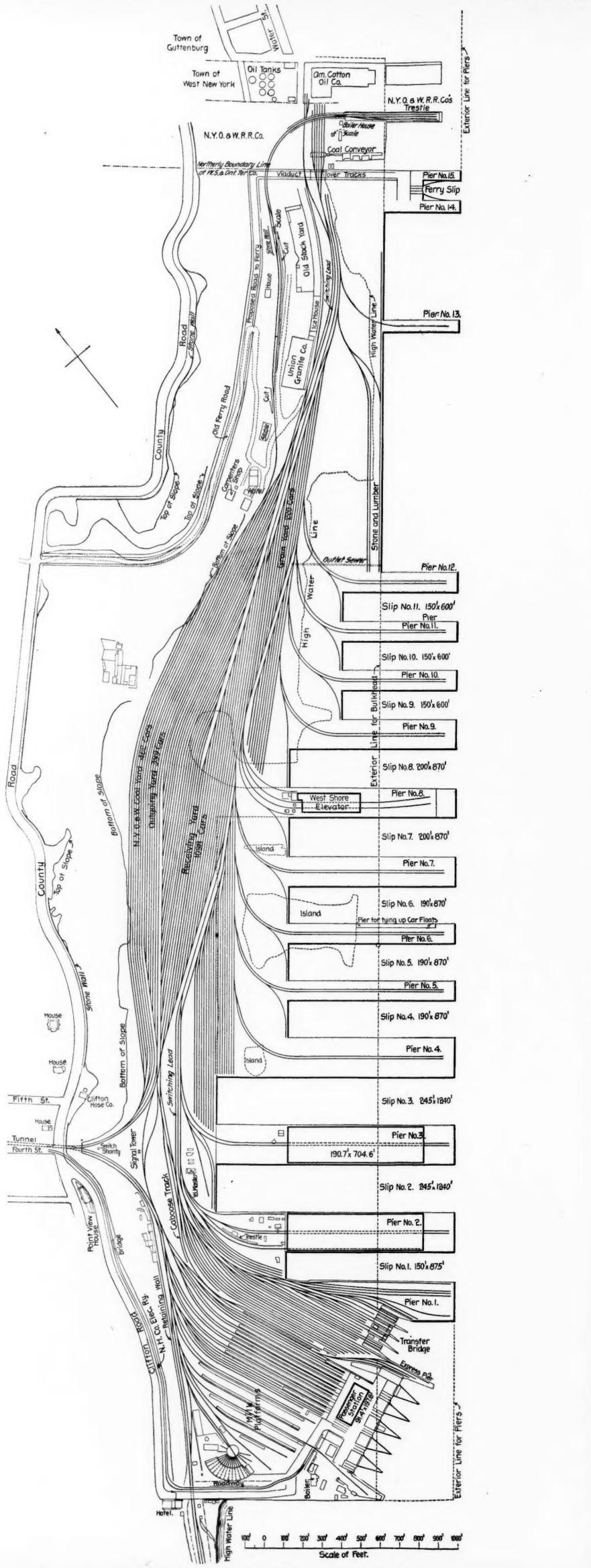
The New York Central has completed plans for extensive improvements at Weehawken, N. J. The frontage of the West Shore & Ontario Terminal Co. is about 6,750 feet. The complete design for the terminal contemplates the construction of fifteen piers running out to the pier line. Pier 1 is already built. Piers 2, 3 and 8 will be somewhat extended and Pier 4 is to be constructed immediately. It is also intended to build immediately the stone and lumber dock—about 1,200 ft. long—and also the next dock, between Piers 13 and 14, which will have a length of about 600 ft. and which may later be equipped as a marine dock.

The accompanying illustration shows the existing high-water line and islands and gives some idea of the great amount of dredging and filling which will be required for the completion of the project. Surveys are now in progress to determine the amount of excavation and filling. Nearly all of the existing tracks in the freight yard will need to be replaced and the larger part of the tracks shown in the present design will be immediately laid. The filling required for the laying of these tracks will be brought by trains from nearby excavations and this work, as well as the tracklaying, will be done directly by the company. The construction of the piers, the dredging, and the remainder of the filling will probably be done by contract, the dredged material being utilized for filling.

The changes to be made in the present passenger terminal are comparatively slight. There will be some change in the platforms by which one additional track will be obtained and the platforms and canopies will be somewhat extended.

The arrangement of the tracks for freight work is the result of a long and careful study on the part of several engineers on the road, and its general design is worth attention. Passing out from the tunnel, the throat of the receiving yard is reached after a run of but a few hundred feet. From here two ladder tracks give ready access to thirty-one sidings having a capacity of 1,098 cars. Grain cars will be run on through to the grain yard, having a capacity of 220 cars, into which they will be *backed* and from which they will be *pushed* (not *hauled*) on to the grain dock (Pier 8). From the receiving yard the cars are run back to the switching leads, from which, by through tracks, the various piers may be reached. Withdrawing the cars from the piers, loaded or unloaded, they will be drawn to the throat of the outgoing yard near the northeastern end, and then run into that yard where there is a storage capacity of 399 cars. At the southeastern end a ladder track leads all these tracks to the outgoing track through the tunnel.

The transfer bridges are reached by several through tracks leading from the receiving yard, which will permit rapid and continuous transfers and reduce the danger of blockades. The caboose track is conveniently located near the entrance of the yard. In addition to the above general design, two vacant spaces will be utilized with



Proposed Rearrangement of Yards at Weehawken—New York Central & Hudson River R. R.

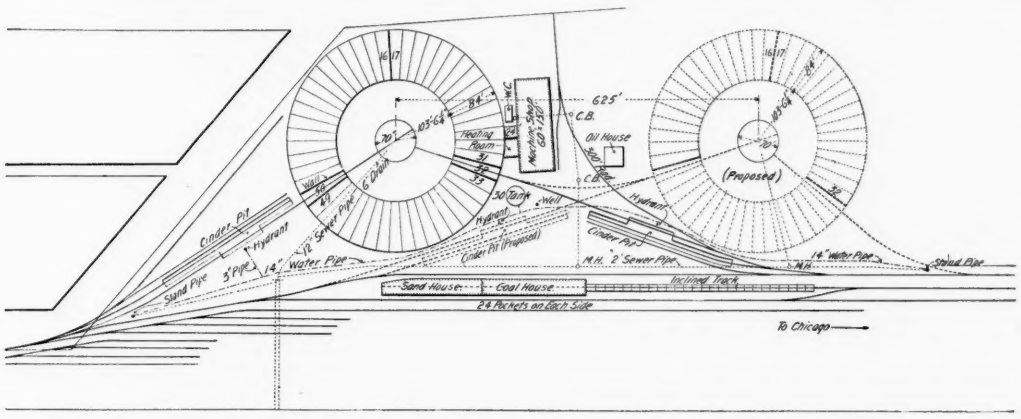
storage tracks having a capacity of about 542 cars. The design is noteworthy in the small amount of unnecessary haulage which will be required of the switching engines.

Until surveys are completed, and until the exact design of the piers is decided on, no precise estimates of cost can be given, but the above changes will probably represent an expenditure of from $3,000,000 to $4,000,000.

WALTER LORING WEBB.

Chicago & Northwestern Roundhouse at Clinton, Iowa.

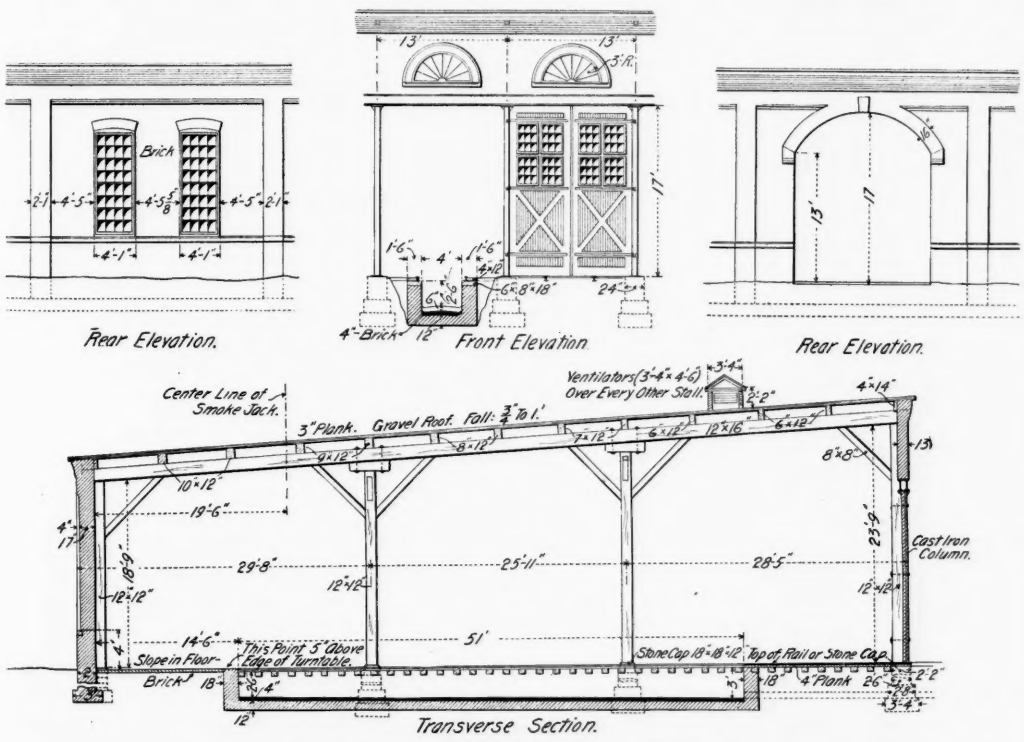
The Chicago & Northwestern has just finished a new 50-stall roundhouse at Clinton, Iowa, which is of interest on account of its large size, the design of the building and its equipment and the arrangement of the tracks, cinder pits, stand pipes and coaling station. It complies in all important respects with the requirements for a modern roundhouse as set forth in a report to the Central Railway Club at the May meeting of this year.



Chicago & Northwestern Round House, Clinton, Ia.

Clinton is a division point for the Galena and Iowa divisions, and it is also the terminus of a short branch line. In all, between 75 and 80 locomotives are cared for at Clinton, the largest of which are 64 ft. 3⅜ in. over engine and tender. These large engines have made improvements necessary in the roundhouse facilities and the new house is located about a mile and a half west of the old one. As shown by dotted lines on the plan, a second roundhouse of equal size can be added whenever the business of the road may require it.

Referring to this plan it will be seen that the line joining the centers of the two houses is parallel to the yard tracks, and an engine, from either direction, going into the house first passes the coal and sand houses, then a stand pipe, and on both spurs leading to the house clinker pits are located. These tracks also are so arranged that engines leaving the house pass a clinker pit and then a stand pipe. A spur from an outgoing track is used to deliver supplies to the machine shop and store room, and the whole arrangement is very compact.



Chicago & Northwestern Round House, Clinton, Ia.

The construction of the roundhouse and pits is shown by the elevations and transverse section, the stalls being 84 ft. long outside of walls. The foundations are rubble masonry and the outer walls brick, while the inner walls are cast-iron columns spaced 13 ft. center to center with rectangular door openings. The overhead clearance of the doors is 17 ft. On these columns rest 10-in. channels placed in pairs which in turn support the inner brick wall. A common shed roof is used sloping outward, ¾ in. to the foot, and covered with gravel roofing, the roof construction and posts being wood throughout. Wooden ventilators are placed over every other stall and each stall has a cast-iron smoke-jack.

The pits are 51 ft. long and the head of each is 14 ft. 6 in. from the outer wall. The sides and ends of the pits are rubble masonry and the floors brick sloping toward the turntable. Brick floors are also used between pits. The roundhouse and machine shops are lighted by electricity and heated by hot air, the Sturtevant system being used. The roundhouse is piped for water and compressed air, and a pipe is also provided for collecting the steam blown off from locomotives. An inclined track serves both the coaling station and sand house. There are 48 coal pockets in the coal house and sand is delivered to engines from the bins by compressed air. Compressed air is also used to operate cranes at the clinker pits. The ashes from locomotives fall into drop bottom pans which are raised by the cranes and dumped into cars which stand alongside. The turntable is 70 ft. long, driven by an electric motor.

We are indebted to Mr. Edw. C. Carter, Chief Engineer of the Chicago & Northwestern, for information and drawings.

Rail Specifications.

We have already published the admirable paper by Capt. R. W. Hunt on "Recent Practice in Rails," as presented by him at the London meeting of the American Society of Civil Engineers. Below are extracts from the discussion of that paper by Mr. Albert Ladd Colby:

In the following brief review the requirements of foreign rail specifications will be compared with those contained in a proposed standard American specification for rails, recently framed by Committee No. 1 of the American Section of the International Association for Testing Materials, and which specification will be presented by this committee at the annual meeting of the American Section, in October, 1900, for discussion and adoption as the standard American specification.

Processes of Manufacture.—In a review of forty-one foreign rail specifications, eight were found which limit the manufacturer to the use of "The best English or Spanish hematite pig iron and charcoal spiegeleisen." This requirement, of course, cannot be complied with in American mills, nor in the present state of the art, does it seem a necessary stipulation in any case, particularly as, if strictly interpreted, it seriously limits competition.

CHEMICAL PROPERTIES.

Carbon.—In 63 per cent. of the forty-one foreign specifications reviewed, limits in carbon are specified, and in the majority of these cases a range of carbon of from 0.10 to 0.15 per cent. is given. This is in general accord with American practice, except that the proposed American standard specification increases the carbon gradually with the increased weight of section, specifying in each case a range of 0.10 per cent. . . . In short, an international standard composition for rails is utterly impracticable, and it is useless for any country, or any engineer, to assert that their composition is the best, and, therefore, should be adopted in all countries.

Phosphorus and Sulphur.—Thirty-two per cent. of the foreign specifications reviewed called for a phosphorus and sulphur of 0.06 per cent. or below. Rails meeting these requirements will be furnished in America at, of course, a considerably higher price than charged for rails of 0.10 per cent. phosphorus, which latter forms by far the largest proportion of the product of American rail mills. Many thousands of tons of American rails of 0.10 per cent. phosphorus have given satisfactory service under severe conditions. The increased cost of 0.06 or 0.08 per cent. phosphorus rails over that of rails containing 0.10 per cent. phosphorus does not, in the opinion of many competent judges in America, obtain a correspondingly safer or better rail from American mills. . . . The writer happens to be in a position to know that the New York Central & Hudson River Railroad Co. has very recently abandoned the 0.06 per cent. phosphorus limit recommended by Mr. P. H. Dudley, and has purchased rails of 0.10 per cent. phosphorus. It can hence be safely asserted that, as far as tonnage is concerned, practically all American roads now use rails of 0.10 per cent. phosphorous.

Silicon and Manganese.—About one-half of the foreign rail specifications examined mentioned limits in silicon and manganese. The silicon specified varies from 0.06 per cent. to 0.25 per cent. The manganese varies between the wide limits of 0.40 per cent. and 1.20 per cent. American mills would not be inclined to furnish rails on a specification limiting the manganese to 0.40 per cent., the requirement mentioned in one specification examined. The American standard specification for rails states that silicon shall not exceed 0.20 per cent., and gives a range of 0.30 per cent. in manganese, the limits varying with the increased section between 0.70 and 1.10 per cent.

In general, it may be stated that the strict adherence, by a foreign engineer, to a specified complete chemical composition, independent of the varying conditions of manufacture, and the rejection of large lots of rails solely because the sample, assumed to represent the lot, exceeds in some respects the specified chemistry, compels his client to pay much more than is necessary to obtain a first-class rail to-day from American mills.

Samples for Analysis.—Some foreign specifications require that every heat of rail steel shall be analyzed for phosphorus and arsenic, and stipulate that if the phosphorus and arsenic exceed 0.06 per cent. the heat is not to be used. It has been proved conclusively that arsenic should not be classed with phosphorus in its effect upon the physical qualities of steel. Furthermore, as there is no rapid method by which both phosphorus and all of the arsenic can be determined, the ingots of each blow could not be held for analysis, but must be rolled into rails and subsequently rejected if the analysis shows a phosphorus and arsenic of over 0.6 per cent. This burden, with the unnecessarily frequent analysis demanded, will not be assumed by the American manufacturer without substantial remuneration, and will more often result in a refusal to bid unless this requirement of the specification be withdrawn.

Another very arbitrary clause in certain foreign specifications states that each 500 tons of finished rails will be accepted or rejected on the analysis of a piece of one rail, selected by the engineer; said analysis to be made, at the contractor's expense, by an independent chemist, selected by the engineer. In American mills the rails pass over several cooling beds, and are drilled on many sets of presses. Without great additional labor, therefore, it is impossible to land the finished rails of consecutive heat numbers in 500-ton piles in the yard, to await the complete analysis of the independent and probably distant chemist. In the light of all that has been published, and candidly admitted by the manufacturer, as to the unavoidable variation in composition even of the different parts of a section of rail, to say nothing of the variation of different rails of a blow, how can an engineer conscientiously accept or reject 500 tons of rails from the analysis of a single rail?

PHYSICAL PROPERTIES.

Tensile Strength and Elongation.—With a specified chemical composition, a drop test, and, in most cases, a dead-weight test also, tensile strength and elongation is an unnecessary requirement. In fact, when carbon and other hardening elements are specified and strictly adhered to the tensile strength and elongation should not also be made the subject of specification. Tensile specimens represent, at best, only a small part of the cross-section of the rail. If taken from the center of the head, the results are affected by the segregation of the hardening elements, and do not represent the portion of the metal subjected to greatest strains in service; if taken from the exterior surface, the results are

apt to be affected by the presence of a few partly welded blow holes. In neither case, therefore, can the tensile specimen be considered as fully representing the rail from which it was cut, much less any lot of rails from which the sample was selected.

Drop Tests Specified.—All the foreign specifications reviewed very properly contain a drop test; some of the drop tests specified, however, are open to considerable criticism. Where chemical composition is specified, and faithfully followed, the drop tests should not include a certain maximum deflection, but should simply specify that the piece of rail shall not break under a single blow on the head, the tup falling from a height increasing with the weight of the rail section. Where the engineer prefers to include a certain maximum deflection in the drop test, besides specifying that the piece of tested rail shall not fracture, the percentage of carbon should be omitted from the chemical requirements. Either method will insure a safe hard rail; but a specified range of 0.10 per cent. in carbon is, perhaps, a better and more prompt means of securing and maintaining uniformity in the product.

Dead-Weight Tests Specified.—This transverse test under static load should include a determination of the yield point, and, by means of still heavier loads beyond the yield point, the determination of greatest permanent deflection. The test may be looked upon as unnecessary when the chemical composition is fully specified and when the ability of the finished rails to withstand shock is determined by a drop test. However, the requirements of the dead-weight tests contained in foreign specifications are met without difficulty by American mills. Seventy per cent. of the forty-one specifications examined specify a dead-weight test, but in quite a number only a weight is used which will give no permanent set. The test is, therefore, frequently regarded in American mills as at least unnecessary, for, when the loads specified are within the elastic limit of the steel the deflections are merely factors of the section of the rail.

FINISH.

Some foreign specifications require, even after the templets have been approved by the engineer, resident abroad, that a section of the rail 12 in. long must be submitted to the foreign engineer and approved in writing before the general rolling can proceed. This is a needless delay, as confidence can be safely placed in the skill and integrity of American manufacturers.

In a number of foreign specifications the permissible variations in height of sections are too rigidly drawn to allow for the unavoidable wear of the rolls. Smoothness of track is in no wise jeopardized by an allowance of 1-64 in. under and 1-32 in. over the specified height; they are the variations permitted by the best American railroads. A number of foreign specifications allow a less variation in length of rail than ¼ in., which is the uniform practice of American railroads.

Most foreign specifications allow a variation in weight of 1 per cent. for individual rails. This can be easily reduced to 0.50 per cent. for the entire order, but the rails should be paid for on actual, and not estimated, weights.

INSPECTION.

The inspectors sent to American mills are frequently unfamiliar with rail inspection, and are, therefore, too strict in their inspection, and too slow in their decisions. Again, when the specifications require all four sides of every rail to be examined for flaws, all holes gaged, each rail tested for length and squared on each end, and stamped in four places by the inspector's mark, and also require him to be present at the testing, to weigh 1 per cent. of the rails, and to watch the loading of the rails to see that only those bearing his stamp are loaded, it is manifestly unfair to the manufacturer to send but one inspector to the mill and expect the manufacturer to conform his product to the number of rails that one inspector can pass upon, in nine or ten hours of the twenty-four. Lack of inspectors frequently necessitates a change of rolls at the mills, and has delayed the departure of vessels on which the rails were being loaded.

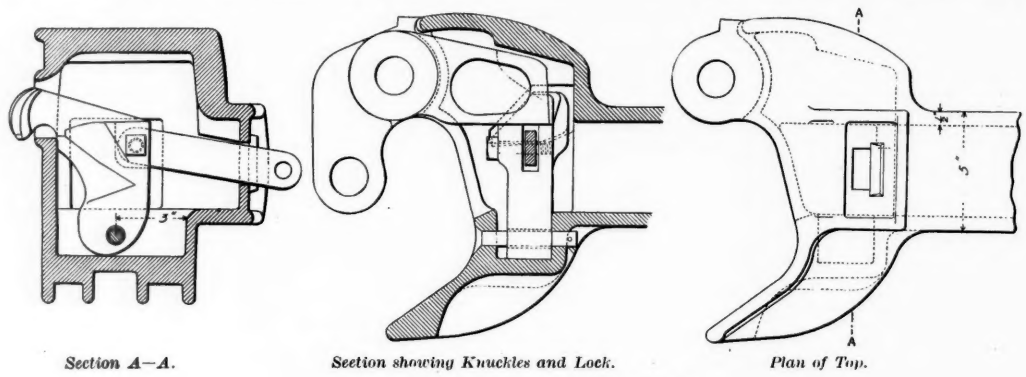
Some foreign specifications require that all rejected rails shall be piled up and kept until the completion of the contract, so that, at any time, the inspector may check them with the numbers entered in the book; and that no rejected rail shall be sold or broken until the completion of the contract. This is manifestly unfair to the manufacturer, because on a large contract, not continuously rolled, a considerable tonnage of second-quality rails might be tied up, which might otherwise be sold. Some foreign specifications state that the final acceptance of the rails and splice bars shall be at the port of delivery. This is unreasonable; final acceptance should be based on tests and inspection made at the place of manufacture.

Metal Car Repairs.

Mr. F. H. Stark, Master Car Builder of the Cleveland, Lorain & Wheeling, is now using a Ferguson locomotive fire kindler for heating the parts of metal cars which have to be straightened, or otherwise repaired, without removing the parts from the car. It is found that this crude oil burner is very well adapted to the purpose, as the heat can be applied directly to the bent parts or cut off quickly, and the burner is safe to use about shop buildings. This device was fully described in our issue of April 20, and was put on the market by Leach & Simpson, Chicago, for kindling locomotive fires in roundhouses. Mr. Stark says that before using the oil burner, it was the practice to build what may be termed a portable forge and build up around the bent part, so as to concentrate the heat. Before any work could be done this had to be broken down so the forge could be moved. As the sections of the metal parts are very light, they cool quickly, making it difficult to do much work between heats. The labor and time involved in moving the portable forge about made the work very slow and costly with the former method, and he finds that metal car repairs are greatly facilitated by the use of the Ferguson burner.

The New American Coupler.

To facilitate the work of coupling and uncoupling trains the American Steel Casting Co. has produced a new all-steel coupler. The special features of this latest coupler are the trigger and knuckle. The design is illustrated in Figs. 1, 2 and 3, a plan and various sectional views and elevations. The relation of parts is made clear in Fig. 1. In Fig. 2 the modified knuckle is shown, and in Fig. 3 the trigger is illustrated.



Section A—A. *Section showing Knuckles and Lock.* *Plan of Top.*

Fig. 1.—New American All Steel Coupler.

It is apparent that an extension of the lock has been made. This is a bevel-faced "dog," which works on suitable bevels on the tail of the knuckle, when the lock of the coupler is opened. The action is upon the rear of the knuckle and therefore sets the knuckle forward in position to couple. When desirable to break the train at one or several places, the operation of unlocking thus sets the main factor of the lock on top of the knuckle, the lock then being in open position, ready to uncouple or to couple, dependent upon train movement, and independent of any further attention by trainmen. It never has been necessary to open the lock to prepare for coupling of cars. The tail of the knuckle raises the lock automatically, in closing, and, having passed it, is secured in locked position by the drop action which is well known. No lock-guard is required in the present form of coupler, as the bearing of the face of the knuckle against the lock is vertical. The chief advantage of this latest arrangement is its constant readiness for action, once it is set, without the attention of trainmen at each coupler where trains are parted or to become so.

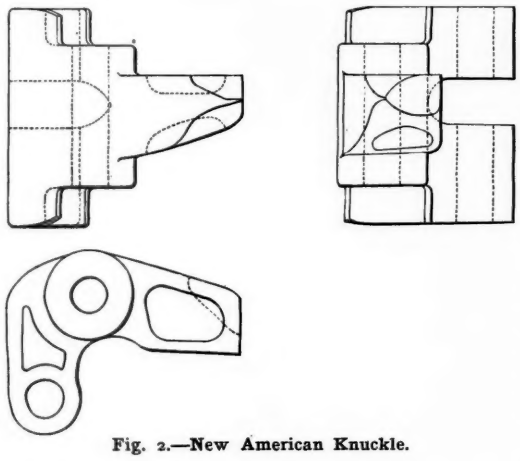


Fig. 2.—New American Knuckle.

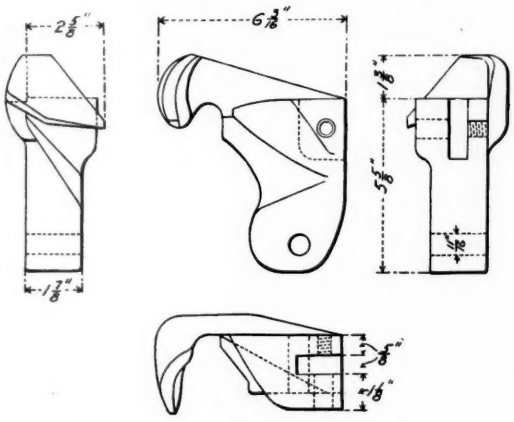


Fig. 3.—American Unlocking Trigger.

Back Lights.*

The great increase in the number of signals installed within recent years on the railroads in this country has demonstrated to all railroad men interested in signaling that the present standard colors for signal indications at night are in need of a radical change, as there are too many chances for a confusion of signals; and derailments directly traceable to this fault are too frequent. The use of the white light for a clear signal at night is the cause of most of the trouble; and the substitution of a green light for white as a safety signal and yellow for green as a caution indication will go far towards eradicating this evil. Most of the up-to-date railroads now use the two-light spectacle on new installations, preparatory to making this change, and it may confidently be predicted that the majority of the railroads in America will adopt these colors as standards in a few years.

The white light is used as a night indication on signals in another way; namely, as a back light while the signal is at safety; whereas the danger position is shown on the back of the signal by a purple light. Not infrequently also has the white back light led to confusion, and it would be a step forward to eliminate this feature.

Until within recent years, one of the serious problems was to obtain a lamp that would burn all night in all weather, and back lights thus came to be considered a necessity, but there does not seem to be any good argument for their use on automatic signals, especially on portions of a road remote from towers. Their use on these signals has led to confusion. This is liable to be the case where two signals, located on opposite sides of the tracks, which govern in opposite directions, are so located that the back lights of the one signal may be seen before or at the same time as the front lights of the governing signal. This may be a rather remote case, but it is not always the most probable conditions that must be met. The use of back lights on automatic signals, especially at such points, may be more dangerous than their discontinuance would be. Some roads have already dispensed with back lights on all automatic signals; and the officials of these roads are so well satisfied with the result of this experiment that the question of restoring these lights has not since been considered.

There seems to be no reason for back lights on signals at interlocking plants, the front lights of which face the tower. In fact, signal lamps have reached such a state of perfection that if it were possible to have some guarantee that the lamps would always receive proper attention, it would be a question whether back lights should be used on any signals. But on those signals that require them we should eliminate the white light and yet give the towerman an indication of the two conditions now shown, namely, when the light is burning, and when the signal is operating properly. The only color left us is purple—the color now used as a back indication on a signal while it is at danger. This color is an ideal one for this purpose, for although it has not sufficient carrying capacity for use as a front light, it can be clearly distinguished at a distance of about a quarter of a mile, far enough for the needs of a back light. The normal position of signals at interlocking plants is at danger, and the signal is at safety only for a few minutes at a time. Why, then, is it necessary to have any light displayed at the back of a signal while it is at safety? Let us suppose that a light be extinguished by the jar of the post occasioned by the signal being pulled to safety. In this case one of two conditions might arise: either the engineman of the approaching train would note the absence of a light where one is usually displayed, and treat the signal as a danger signal, or, uncertain of the previous existence of the light, or its location, he would pass the signal. Certainly in the first case no accident could happen; while in the second a train would merely pass a signal at safety. There does not seem to be any possible chance for an accident under either condition, and no more probability of delay than in the present practice. By this arrangement of back lights an indication of the improper working of the signal would also be given, as there would

*Paper to be read before the Railway Signaling Club, Atlantic City, September 11.—Condensed. By W. H. Lane, Supervisor Mechanical Signals Lehigh Valley R. R.

be a blue light displayed with the signal when at danger, and no light when at safety. The back spectacles should be so designed that the blue glass cover the light at all times except when the blade is in the horizontal position. The towerman is thus assured that a danger signal is displayed in the front of a signal whenever the blue light is visible. Such a spectacle would not require a blue glass, as the light would be displayed through a blue glass in the back of the signal lamp.

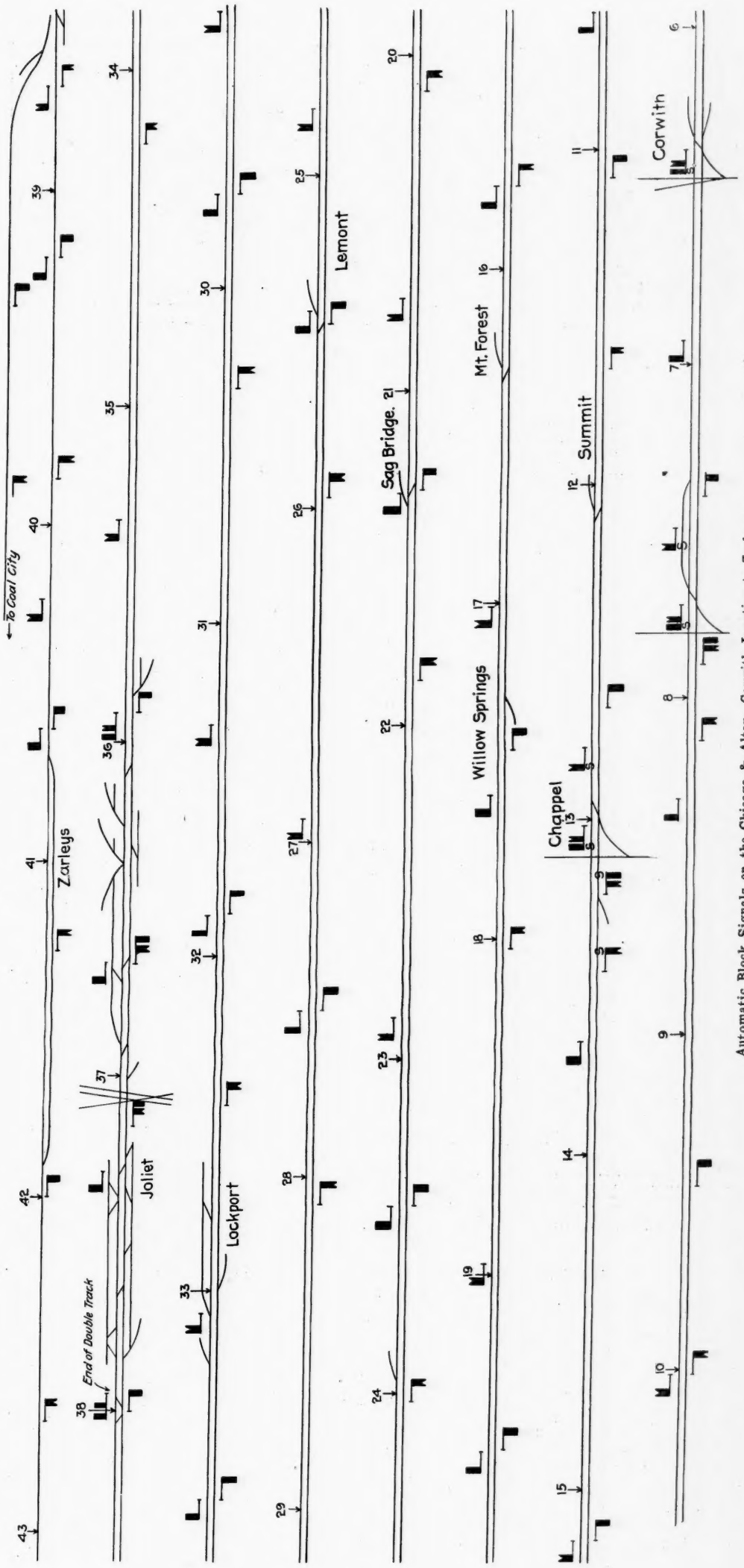
Automatic Block Signals on the Chicago & Alton.

A sketch of the portion of the line of the Chicago & Alton which is now being equipped with automatic block signals by the Hall Signal Co. is shown in the accompanying engraving. The road to be signaled is from Corwith Junction to Joliet, 31.5 miles, double track; Joliet to Zarleys, 5 miles, single track, and two miles out from Joliet on the Coal City Branch, single track, making the total length of road signaled 38½ miles.

The signals are semaphores, and each signal (or pair of signals on the same post) is moved to the all-clear position by an electric motor worked by a battery. The face of the home signal blades is painted white with a black stripe near the outer end and parallel to it. The blades of the distant signals are yellow on the face, with two black stripes, 2½ in. wide, parallel to the outer (notched) end. (Semaphore blades 4 ft. long, with white faces, are used on this road for train order signals.) The signals are to have green lights for the night all-clear indication; and the distant signals, when against a train, will show a yellow light.

Forty-three home signals and 39 distant will be put in, and five home and four distant signals now in service at railroad crossings will be connected with the automatic system by electric slots, the track circuit being carried through the interlocking plants. The average length of block is about 1½ miles, the shortest block being 3,000 ft. and the longest 2.4 miles. The home signals are to stand normally in the stop position, and the distant signals, also standing normally horizontal, can be cleared only when the home signal is clear. Each home signal will be cleared (if its block section is free for the passage of trains) by each approaching train as it reaches a point about 1,200 ft. short of the distant signal. With this arrangement the engineman will be able to see the distant signal change to the clear position. The number of switches in the main line is 64. These will set signals at stop when they are open, and will be provided with audible indicators. The audible indicator, a bell, will begin ringing when an approaching train enters the clearing section, 1,200 ft. in the rear of the distant signal.

On the single track lines the automatic signals are arranged to protect trains in both directions, the arrangement of the circuits being the same as that on the Cincinnati, New Orleans & Texas Pacific, which was described in the *Railroad Gazette* of Nov. 12, 1897.



Automatic Block Signals on the Chicago & Alton—Corwith Junction to Zarleys.

The Transportation Show at Paris.

The Western Railroad Co. of France has an opportunity to show something in the way of electric traction at the Paris Exhibition. The line from Issy to Viroflay is designed to connect the Champ-de-Mars with Versailles, and is largely in tunnel and, of course, is worked by electricity. The central power station at Issy will furnish 9,000 kilowatts, using a five-phase current at 5,000 volts, which will be transformed at three substations. From this station also current will be furnished for lighting the stations and for various mechanical purposes about the stations.

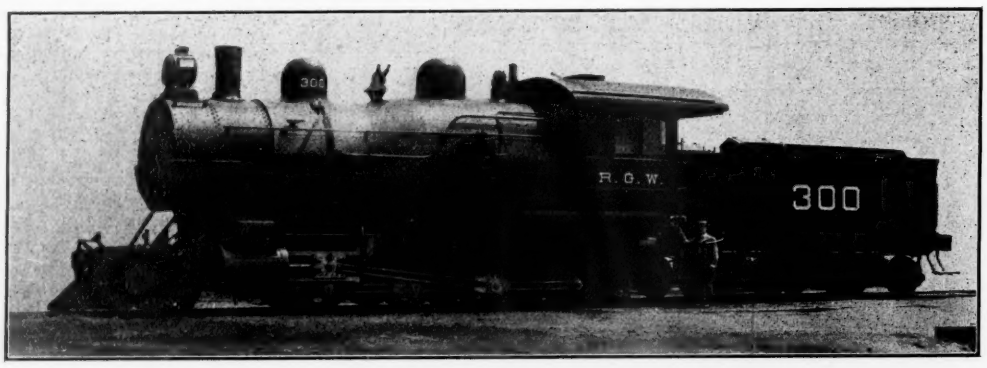
The 10 electric locomotives which the company will put in service are shown by drawings. They are mounted on two bogie trucks, and each axle carries a motor. There are two types of these motors; one is mounted directly on the axle and the other is geared. There are two controllers, one at each end of the locomotive, so arranged that the motors form two independent groups, and the motors of one truck can be cut out entirely. These engines have Westinghouse air-brake as well as hand-brake.

Only about two kilometers of the line is now in operation, and this is worked by motor cars, the locomotives not yet being in service. As now used, each train has two motor cars, one at each end, and between them are run one or two cars without motors. Each motor car has two 40 h. p. motors. A train of four cars has 360 seats, and weighs about 90 tons. The maximum speed between stations is 27 to 30 miles an hour. This service was opened with the opening of the exhibition, and has been working regularly since.

The company has four compressed air locomotives for use at the Invalides station and for service in the tunnel, if required. These have two bogie trucks, the axles being couples to and to. The motors are compound, each having two cylinders, the pressure in the high pressure cylinder being 284 lbs., and in the low pressure cylinder 142 lbs. The storage pressure of the air is 1,420 lbs. The locomotives are provided with hot water tanks, each carrying 2,260 liters, and heated by steam blown in at a pressure of 258 lbs. The high pressure cylinders are 12½ in. diameter, the low pressure 20½ in. and the stroke is 22 in. These locomotives also have Westinghouse air-brakes and hand-brakes.

Richmond Consolidation for the Rio Grande Western.

Descriptive specifications and an illustration of one of eight consolidation locomotives, built by the Richmond Locomotive & Machine Works for the Rio Grande Western Railway Co., are here given. It may be noted that with cylinders 22 in. x 28 in., driving wheels 56 in. diam., and 168,000 lbs. on driving wheels, out of a total of 185,000 lbs. in working order, these locomotives rank well up in the list of modern heavy freight engines.



Richmond Consolidation Locomotive—Rio Grande Western Railroad.

DESCRIPTIVE SPECIFICATIONS.

General Dimensions.

Gage	4 ft. 8½ in.
Weight on drivers	168,400 lbs.
" in working order	185,000 lbs.
Wheel base driving	16 ft. 8 in.
" " total engine and tender	52 ft. 11 in.
Total length of engine and tender	63 ft. 2¼ in.

Cylinders.

Diameter	22 in.
Piston stroke	28 in.
" rod diameter 4 in., material	iron
" " packing	Jerome metallic
Steam ports	1⅝ in. x 21 in.
Exhaust ports	3¼ in. x 21 in.
Bridge width	1½ in.

Slide Valves

Style	Richardson balanced
Greatest travel	6 in.
Lap outside	1 in.
" inside	0 in.
Lead in full gear	1/32 in.
Valve stem packing	Jerome metallic

Wheels.

Driving, number	8
" diameter	56 in.
" centers, material	Cast steel
" box "	Cast steel
" axle journal	9 in. x 12 in.
Crank-pin, main	Steel 7 in. x 6½ in. and 7¼ in. x 5⅞ in.
" " side rods,	Steel 5¾ in. x 4½ in.—5¾ in. x 4¾ in.—6¼ in. x 5⅜ in.
Engine truck, style	Center bearing, swing motion
" " wheels, number 2, diameter	30 in.
" " " centers	McKee Fuller C-iron
" " axle, steel; journals	6½ ft. x 10.. in.

Boiler.

Type	Radial stay, extended wagon top
Working pressure	185 lbs.
Outside diameter 1st course	74 in.
Thickness of plates, in barrel	¾ in. and 13-16 in.
" " roof and sides	⅝ in.
Seams, circumferential	Double riveted
" horizontal	Sextuple riveted
Fire-box, length	122 in.
" width	41 1-16 in.
" depth	Front 77¼ in., back 71 in.
" material	Steel
" plates	Sides 11-32 in., back 11-32 in.
" "	Crown 11-32 in., tube ½ in.
" water space	Front 4½ in., side 4 in., back 4 in.
" crown stays	1⅛ in.
" stay bolts	15-16 in. and 1 in.
Tubes, material iron; length	14 ft. 2⅞ in.
" number 318, diam. 2¼ in., thickness No. 12-B. W. G.	
Heating surface, tubes	2,667 sq. ft.
" " fire-box	206 sq. ft.
" " total	2,873 sq. ft.
Grate, style	C-iron, rocking, finger
" area	34.7 sq. ft.
Exhaust pipe, style	Single
" " nozzle	5½ in.
Smoke stack, inside diameter, smallest	15 in.
" " top above rail	14 ft. 8½ in.
Feed water supplied by	Ohio injectors

Tender.

Weight, empty	43,200 lbs.
Frame	Steel
Wheels, number 8, diameter	33 in.
Journals	5 in. x 9 in.
Wheel base	17 ft. 11 in.
Tank capacity, water	5,000 gals.
" " coal	10 tons

Canals and the Railroads.

From an address by Mr. Daniels, published in the August issue of the Proceedings of the St. Louis Railway Club we make a few extracts.

Reliable statistics of the Erie Canal traffic are not obtainable for the earlier years of its operation, but in accordance with the last annual report of the Superintendent of Public Works of the State of New York, we find that the tonnage of all the property carried on all the canals in both directions, in 1837, was 1,171,296 tons, valued at $55,809,288. The tonnage and the value increased until 1872, when it amounted to 6,673,370 tons, valued at $220,913,321. From 1872, the tonnage and the value of the property carried decreased, until in 1897 there was only 3,617,804 tons carried, with a value of $96,063,338. This, in face of the fact that the receipts of grain and flour at Buffalo had increased from 1,184,685 bushels in 1837 to 242,140,306 bushels in 1897. The greatest number of new boats registered as operating on the canals in a single year was in 1862, when there were 850 new boats. In the year 1897, there were only 16 new boats registered. You will wonder what has caused the abandonment of several canals in the State of New York, and the steady decline in the commerce passing through the Erie Canal.

There are three general causes for these results. The first is the reduction in the rates of freight by the railroads. The second cause is the development of the motive power and rolling stock of American railroads. Less than a quarter of a century ago, on the average American railroad, the capacity of a freight car was 20,000 lbs.; the capacity of a freight engine was from 20 to 30 of such cars to the train. To-day, on the New York Central, the capacity of the grain cars is from 60,000 to 66,000 lbs., and a locomotive of the latest type will haul from 75 to 90 such cars loaded to their full capacity. It is not an infrequent occurrence for a single engine to haul through the Mohawk Valley, beside the Erie Canal, 85,000 to 90,000 bushels of grain in a single train. The same engine will haul from 110 to 125 empty cars. When you consider that in the busy season there are from 75 to 100 such trains a day passing over the New York Central alone, you will get some conception of the situation.

The third cause for the failure of the canals is the general demand of the American public for quick time. A shipper having 100,000 barrels of flour, or 1,000,000 bushels of grain for export, must move it from Buffalo to New York within a specified time, and he cannot risk the slow process of the canal.

To this we should add a fourth cause, viz., the legal restrictions which have hindered the development of the efficiency of canal transportation. For years laws designed to protect the small boat owner have limited the amount of capital that might be used in working canal boats.

Automatic Block Signal Failures Due to Lightning.*

There are two kinds of failures of automatic signals due to lightning; failure to clear and consequent delay to traffic and failure to go to danger and consequent imperiling of safe train movements. Three years ago the efforts of signal and railroad companies were directed to the abolition of the latter evil, and I believe that I am within the truth in saying that it is possible now to prevent (except possibly in rare instances) lightning or any high potential foreign current causing the false display of clear signals. To-day the problem is how to avoid the other evil, the setting of automatic signals to danger by lightning currents. The introduction of the carbon contact for relays and their use in combination with fuse wires, has solved the first problem. A lightning arrester which will take care of the heavy discharges without opening the circuit, combined with the use of carbon to prevent the fusing of relay contacts by so much of the lightning current as may pass through the arrester, are the devices apparently which must be employed to solve the second problem. I believe that it is too early to say that the solution of the latter has been accomplished; nevertheless, the service rendered by the choke coil lightning arrester encourages the belief that it or some better device will accomplish what is desired. The fuse wire is the chief agency of our present woes, and until it is dispensed with, the block signal maintainer is sure of an abundance of calls during the lightning season.

The only utility of fuse wires where carbon contacts are employed is to protect the relays and signal instruments from the heavy lightning currents; if these can be diverted to the ground before reaching the instruments the problem will be solved. It is possible that the railroads, through over cautiousness, have made too free use of low capacity fuse wires. A great many one ampere fuse wires are blown by currents which would not injure the instruments, were no fuse wires used.

We have 146 miles of double track blocking in use and a fair amount of lightning is allotted to our territory each year; 138 miles of this blocking is controlled by track circuit, the remaining eight miles by the track instrument system. Previous to 1896 the Michigan Central had 31 miles of automatic blocking in service, a little more than half of which was controlled by track circuit. Practically no trouble was had with the track instrument system, as the line wires did not lead to ground or come into close proximity with grounded circuits. The signals controlled by track circuit were affected some, but as the line wires were mostly confined to the overlap section, and as few lightning storms passed over this territory during the two years in which these signals were in service prior to 1896, the difficulties experienced were so few that the lightning question was considered of little importance. In 1896 110 miles of track circuit automatic signals were installed. On this installation, indicators were used at all main track switches and the consequent long lines of overhead wire aggravated the difficulties. The first arrester used was the old style saw teeth type, the ground plate being connected with the relay wires which led to the rails of the track. The lightning currents which fused the relay points did so on account of the path afforded through the track relay, track wires and rails to ground, and as the air gap between the contact strips and ground plate of the arrester was less than that between the armature and magnet coils of the track relay, it was naturally inferred that high potential currents would take the path of least resistance and thus avoid fusing the contact springs. The service rendered by this form of arrester, even when combined with fuse wire protection, did not prevent the fusing of platinum contact points, and consequently these arresters were abandoned in 1898 and carbon contacts strip and ground plate arresters having a high resistance substance for making contact between the ground plate and the contact strips, which were connected to the track and line wires, were substituted. One ampere fuse wires for track and two ampere fuse wires for line circuits were used in connection with these arresters. The ground plates in this case were connected with galvanized iron pipe driven in the ground, experience having proved that the use of the rails as grounds increased the number of signal failures.

To further guard against the danger of fused points, carbon points were used in relays to control all line circuits and the Buchanan back contact shunt was applied where track circuits were controlled, in order to shunt the track battery should the front contact fuse. It was considered impracticable at that time to use contact points made of carbon for controlling the low potential track currents, on account of high resistance of that substance. Since these alterations were made there has not been a single case of a signal being held clear by fused contacts, although many instances have occurred of the signals being held at danger on account of blown fuse wires. From January 1 to August 20, 1900, 36 per cent. of the failures of signals to clear were caused by lightning, and nearly all of these failures were due to blown fuse wires. In 1899 five miles of the semaphore type of automatic signals were installed, carbon contacts being used to control all circuits and 2½ ampere fuse wires and choke coil lightning arresters being used in all line circuits, no safeguards other than carbon contacts being provided for the track circuits. In this instance, the arresters instead of being in the relay boxes were located in cast-iron boxes on the telegraph poles. Two types of choke coil arresters are employed. In one the coil of wire is wound on a hard rubber spool or cylinder, in the other the wire is wound on a porcelain spool having a hollow center in which is inserted a soft iron core. The Hall Signal Co. claims, from a series of tests made with a high potential current, that the simple choke coil arrester discharged about 54 per cent. of the current to ground, while the iron core coil discharged 95 per cent. of the current to ground. I believe the theory is, that the iron core offers an additional retarding effect to the flow of the current, thus causing it to discharge more freely to the ground plate. On this latter section of blocking, no signal failures have occurred due to lightning since this installation was completed, although lightning troubles have been experienced both East and West of this section of blocking, and the porcelain spools of three of the arresters have been shattered by lightning. It is too soon to judge of the efficiency of this method of protection, but as there are line wires throughout each block and several lightning storms have passed over this section, the inference to be drawn, encourages a fair hope for the future.

On 15 miles of double track blocking to be installed on the Canada division this fall, the semaphore type of signal will be used and distant signals will be provided instead of overlaps. Polarized relays instead of line wire will be employed for controlling the distant signals, thus reducing the field for lightning troubles as far as possible.

Where line wire is used for indicators and for controlling slots on interlocking signals, the choke coil arresters with iron core centers will be used, but no fuse wires will be employed either in the track or line circuits. Carbon points will be depended upon to prevent fused contacts due to light discharges, and the choke coils will be depended upon to take care of the heavy discharges. The majority of the blocks on the Michigan Central are two miles in length, and each two-mile block is subdivided into four sections, consequently there are numerous cases where the relay of one section controls the battery of the next section. The use of carbon contacts for controlling track batteries in this way has been found satisfactory on the five miles of blocking installed last year. The average resistance of carbon contacts, established by several tests on instruments of two years' service, was ⅓ ohm. The average resistance of one ampere fuse wires which were in service but a few days, based on several tests, was 1-5 ohm, therefore by the substitution of the carbon contact for the fuse wire, only 2-15 of an ohm's resistance was added to the circuit and this is far from a prohibitive resistance, even when the ballast is against the rails, as is the case on the Michigan Central, and this difference in resistance is considerably reduced as the length of service of the fuse wire is increased.

Greater effort will be made to secure good ground connections than has been made in the past. It is proposed to dig holes deep enough to reach permanently damp earth, to imbed copper plates in crushed charcoal at the bottom of such holes and to use copper wires to make the connections between the copper plates and the arresters.

It will be an easy matter to provide fuse wires if their

*Paper to be read at the meeting of the Railway Signaling Club September 11, at Atlantic City, N. J.—Condensed. By H. D. Miles, Signal Engineer Michigan Central.

service is found necessary in order to protect the relay and indicator coils from frequent injury, but an occasional damage to such instruments will be considered of less importance than the frequent blowing of fuse wires.

Convention of Southern Railroad Commissioners.

The convention of Railroad Commissioners of certain Southern states, which met on the invitation of the Commissioners of Mississippi, issued several weeks ago, was held at Lookout Mountain, Aug. 29 and 30. Mr. Reagan, of Texas, was made temporary chairman and Mr. McInnes, of Mississippi, permanent chairman. Commissioners were present from Arkansas, Florida, Kentucky, Louisiana, Mississippi, Tennessee and Texas. A resolution was adopted calling on Congress to pass laws to empower the "Railroad Commissioners of the United States" to prescribe rates on Interstate traffic; to provide that when a Federal court enjoins a state commission from enforcing reduced freight rates the injunction shall not take effect until the case has been fully presented and argued; and to provide that the courts in estimating the reasonableness of a railroad's earnings and profits within a certain state, shall include the amount earned in that state on interstate traffic.

On the second day the meeting entered on a general discussion of the Interstate Commerce law, uniform classification and the relation of rates in one state to those in adjoining states. It was resolved that the State Railroad Commissions of the Southern states should constitute an association for mutual benefit. Whenever the Commissioners of any one of these states has a legal contest with a railroad concerning rates, the other states shall assist those Commissioners so far as possible.

It was resolved that as the preparation of a uniform classification for all the states would take a good deal of time, it was the sense of the meeting that the Commissioners of each Southern state should adopt Southeastern Classification No. 25 (October, 1899), to be used until a better one can be made. The effect of this resolution is to disapprove the classification now used by the railroads of the South (No. 27) in which many commodities are classed higher than in No. 25.

Mr. Reagan, of Texas, was made permanent Chairman of the organization, and Mr. John A. Webb, of Mississippi, Secretary.

A vote was passed to hold a meeting at Asheville, N. C., Sept. 10, 1901.

Water Power for Electric Railroads—Minneapolis and St. Paul.

From a paper on this subject, presented at the April meeting of the Northwest Railway Club by Edward P. Burch, the following extracts are taken:

Within a few years a new dam has been built in this city across the Mississippi River, just below St. Anthony Falls, electricity has been generated by the power produced at the dam, and utilized for the electric railroad system of Minneapolis and St. Paul. The source of power is the upper Mississippi River, a peculiar stream; generally quiet and governable, yet at times of flood apparently beyond control. The United States Government is constructing permanent dams at the outlets of the great swampy lakes on the upper Mississippi, forming reservoirs to collect surplus water, which may be systematically released. This storage capacity may ultimately become 100 billion cubic feet. Not only is the intensity of the spring and fall floods thus reduced, but navigation is facilitated and a more equitable distribution of water for power results. At present the general mean minimum flow in February is about 2,500 cu. ft. per second; the spring flood commonly reaches 15,000 cu. ft. per second, and the summer flow at least 6,000 cu. ft. per second. By utilizing local storage the amount of power available may be increased 10 per cent. at times of heavy demand.

Within the limits of the Twin Cities the Mississippi has a fall of over 110 ft. Just above the city limits there is what is known as Coon Rapids, where there is a fall of 20 ft. This power has not been developed. Between the Minneapolis Western R. R. bridge at Eleventh avenue South in Minneapolis, and Fort Snelling bridge in St. Paul, there is a fall of 40 ft., along which the Government has laid out and is now constructing locks and dams. The main St. Anthony Falls, with a fall of 50 ft., have been utilized for 40 years. With normal summer flow 6,000 cu. ft. per second, about 25,000 mechanical horsepower is available, and used, largely for flour manufacturing. St. Anthony Rapids, just below the main falls, have been developed within the last few years. The construction of a dam below what was formerly known as the "rapids" (now known as the lower power) had been in the minds of capitalists and engineers for many years. With normal summer flow it was estimated that a dam giving a 20-ft. fall could develop 10,000 h. p. The riparian owners, St. Anthony Falls Water Power Co., started the construction of this new lower dam at St. Anthony Falls in May, 1895. The work was finished and turned over to an operating company Jan. 1, 1898. In the construction of the lower power the general plan carried out was to build a dam directly across about two-thirds of the main river, then making an obtuse angle run diagonally across towards the east bank to a power station at the foot of the canal or head race thus formed. This plan of construction was a most advantageous one. The walls of the canal were built first, and on the dry east bank the great waste gates were installed and the power station foundations were completed, all during the first season. In 1896 the water of the entire river was deflected from its old bed into the new canal and sent through the waste gates and also under the power station. A coffer-dam was then built across the old bed of the river. The main dam 2,000 ft. below the upper falls was then started, and was nearly completed during the second year. At the beginning of the third year, the spring of 1897, a most disastrous flood, amounting to 60,000 cu. ft. per second, swept away the coping and other portions of this section. In repairing this break a rock-filled, timber-framed approach, lined with steel plate, was built in front of this section of the main dam, in order to ease the battering which piers, logs and ice give the structure.

The dams are 1,085 ft. long, and the height is from 14 to 16 ft. above the river bed. The power station forms 200 ft. of the dam. Inside, it is one large room, 250 ft. long, from 45 to 55 ft. wide, and 50 ft. high inside. In the water chambers 10 large turbine units were installed. The capacity of each unit is approximately 1,150 h. p. on 20-ft. acting head, at 130 revolutions per minute. Each 1,150 h. p. turbine is direct connected to a 1,000 h. p. electric generator, the turbine shaft passing through a water-tight flume cover into the generating room. Ten 1,000 h. p. and two 150 h. p. generators have been installed.

The Twin City Rapid Transit Co. owns and operates the entire electric railroad system of Minneapolis and St. Paul. They have 240 miles of track in service. Their annual revenue is over $2,500,000, from 50,000,000 passengers. Their annual car mileage is 13,000,000. The maximum number of cars in ordinary daily service is about 400; in maximum service, 550. From 1891 to 1897 they had four steam plans with a capacity of 11,500 h. p., equipped with modern boilers and engines and fairly modern generators. A 40-year lease of all the power produced by the dam was effected by the railroad company about Jan. 1, 1897. Given 10,000 h. p. at the dam, the problem was to convert this power into electrical energy and distribute it to 500 cars scattered over two cities. About 60 of the heavier cars were within a mile of the station. The generation and transmission of 2,000 h. p. for these 60 cars was planned and carried out by using low voltage direct current. This low voltage, 600 volts, is adapted only for short transmissions. It was necessary to send 3,000 h. p. to No. 1 steam station, now known as a sub-station. The distance from the water power station to this sub-station is 1½ miles. For this transmission it was necessary to employ alternating currents and to use a pressure six times as high as that used for the short and ordinary transmission just referred to. Similarly 1,000 h. p. is sent to No. 2 steam station, now a sub-station. For St. Paul, 2,000 h. p. was sent to No. 3 sub-station, formerly the old steam plant, and 2,000 to sub-station No. 4, a building and location especially selected for the purpose. The two transmissions to St. Paul were especially long, seven and nine miles. It was necessary to use 12,000 volts, the highest pressure heretofore carried for heavy power distribution in underground cables, and many were the prophesies of failure. One cable, 2 in. in diameter, was used for each 2,000 h. p. transmitted. Each cable contains three wires, each .4 in. in diameter, separated and insulated from each other and from a lead sheath by common manilla paper impregnated with resin oil, linseed oil and other insulating compounds. The cable is drawn in cement conduit ducts 3 in. in diameter. These ducts are protected by concrete, and are laid about 3 ft. below the road bed. Manholes are located every 500 ft. for the purpose of drawing the cables in the duct, making cable splices and for inspection and repairs.

Couplers for Double Heading.

At the August meeting of the Southern & Southwestern Railway Club a committee reported on the subject of "The best mode and coupler to be used between engines in double-heading engines in freight service." The committee consisted of W. N. Cox, J. J. Thomas and J. B. Michael. The report follows:

None of the manufacturers of automatic couplers for front end of engines or back of tenders, have as yet supplied the wants of the service for which they are intended. We think it necessary to have a more elastic and flexible coupler designed by the manufacturers, so arranged that there will be a limited vertical and lateral motion, to prevent the excessive wear of the knuckles and guard-arm on couplers, and at the same time admit a freer motion of the engine. Where double-headers are used there is a constant vertical and lateral motion of the long consolidation engine, which is very noticeable at the coupler. The semi-rigid type of coupler more generally in use has the tendency to shear the cylinder saddle bolt through the frame, break the front frame casting, wrench the pilot beams, breaking the pilot knees, also breaking the stays and shearing the bolts in coupler attachment, contributing to engine failures, and fraught with great dangers by dropping drawheads on the track, also excessive friction on the flanges of engine truck, inviting derailment and disaster.

The solid casting for the rear of the tank, which seems to be used extensively throughout our territory, is entirely too rigid, which invites excessive strains, causing the casting to break in such manner that no repairs can be made, necessitating replacement at too great a cost; where used on engine of long wheel base there is also an element of danger in respect to derailment on curves of over 7 degrees.

There exists a preference for the drop or swing coupler, probably to remove the possibility of striking stock, which we do not particularly favor, for the reason that the construction of these couplers is such that to obtain sufficient strength for double-heading makes them unwieldly, and the pilot generally unsightly, and the investigation of the committee in respect to casualties occasioned by stock being knocked down by the bull-nose type of drawbar not sufficiently numerous to warrant the assumption that the bull-nose or rigid coupler is objectionable.

The most desirable form of coupler for double-heading would consist of the standard automatic coupler, with the buffer block and yoke as per M. C. B. drawing No. 11, for both pilot and tender, the details of attachment to tender pilot to be such as the height of the engine and tender might require to maintain the standard height; the question of vertical and lateral motion to be allowed to be determined by the topography and curvature of the particular locality in which the device was to be used, but in general it is the opinion of the committee that the flexibility allowed as per M. C. B. recommended practice, drawing B, will be found sufficient.

Upon motion, the report was accepted, and placed on the minutes, subject to discussion at the next meeting.

Speed of Express Trains in Austria.

In a recent number of this paper, eminent writers have discussed the question of how far locomotive building was responsible for an increase in speed. Among other matters the speeds attained by trains in other countries were quoted and it was suggested that the Austrian public had least reason to demand increased speed. Such an assertion cannot be left unanswered, and it is only right to prove that in certain ways the present conditions of transport are in urgent need of reform.

The point of interest to a traveler is not the running speed but the average speed of the train that carries him to his destination. We shall therefore confine ourselves to the latter. Let us compare the speed of the trains running between Vienna and the frontier stations with that attained under similar conditions by trains leaving Paris and Berlin. Confining this comparison to ordinary expresses, exclusive of *luxe* expresses which concern only a very few people, we find the following figures applying to Austria:

	Ave. speed per hour.
Vienna-Feldkirch	26.2 miles
" Salzburg	27.3 "
" Trieste	28.7 "
" Eger	30.3 "
" Tetschen	33.2 "
" Bodenbach	35.2 "
" Budapest	36.4 "
" Prague via Gmünd	37.4 "
" Cracow	38.2 "

The above table shows that all the lines belonging to the Austrian State Railroads, with the exception perhaps of the Vienna-Prague line where competition with a private line has evidently caused an increase in the average speed maintained, are far behind the private railroads. A single exception is afforded by the Südbahn, but the public estimate of this line is lowered by the neglect with which it treats the requirements of its passengers (*e. g.*, the bad lighting of its carriages, etc.). It will also be seen from the table that the trains running westward travel at even a lower average speed. This is not to be wondered at when we find that the express from Vienna to Salzburg stops on the average every 10.6 miles, while between Vienna and Cracow the average distance run between two stops by an express is 28.6 miles.

In Germany we find the following as the average speeds of expresses on the main lines:

	Ave. speed per hour.
Berlin-Frankfort	37.9 miles
" Cologne	40.2 "
" Königsberg	40.4 "
" Breslau	40.9 "
" Hamburg	49.3 "

In France, where the railroads are worked by private companies, the figures are as follows:

	Ave. speed per hour.
Paris-Avicourt	38.5 miles
" Marseilles	41.3 "
" Bordeaux	44.1 "
" Belfort	45.1 "
" Maubeuge	45.4 "
" Calais	50.1 "

We see from the above tables that the average speed, inclusive of stops, is considerably higher in France than in Germany.

We may fairly ask ourselves what in Austria is the lowest speed that still entitles a train to be called an express. The first table shows us that on our State lines the speed of so-called express trains does not exceed the normal speed of ordinary trains on the Prussian State Railroads.

Much more might be advanced on this subject, and our society would be doing a great service in constituting itself the mouthpiece to express the perfectly legitimate wishes of the public. One of the things needed is the improvement of the shocking service between Vienna and the winter resorts in the Tyrol. At present it takes half of one day and a whole night to get there. From Vienna to Botzen, via St. Michael, it is only 395.2 miles, and it takes 14 hours to do this journey by daytime, or an average speed of 28.2 miles an hour; even in Austria such a speed cannot be regarded as too high. Moreover, such an express, running in the daytime and so urgently required, ought not to be regarded as a *train de luxe*.—*Journal of the Austrian Society of Engineers.*

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EDITORIAL ANNOUNCEMENTS

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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Orders were noted in our news columns, during the month of August, for 6,176 cars of all kinds and 129 locomotives. This is practically the same number of cars ordered the month previous but a considerably larger number of locomotives than in any month since April. The division of the car orders is: Box, stock and refrigerator cars, 1,700; coal and ore cars, 2,403; flat cars, 1,726; tank cars, 9; steel cars, 300, and passenger cars, 38. There were ordered 21 passenger, 94 freight and 2 switching locomotives, and 12 locomotives were ordered by foreign roads.

The convention of State Railroad Commissioners, which was held at Lookout Mountain last week, appears to have been rather more worthless in expression and action than the similar (annual) conventions that are participated in by representatives from all parts of the country. As will be seen by our report, which is taken mostly from *Leonard's Railway News*, the only action of any consequence taken by the convention, aside from reiterating the views already expressed at Milwaukee and Denver, was to protest against the advances in freight rates recently made by the railroads of the Southern States. Up to this time the only complaints concerning these rates which had been published, so far as we have observed, were those of the wholesale merchants (chiefly in New York), whose shipments are almost or quite all interstate. Representatives of these wholesalers were present at the meeting. As the commissioners who met have no authority over interstate rates it would appear that the action of the merchants in enlisting their influence must have been intended chiefly for moral effect on the railroads. So far as we can judge, the principal basis of the demand of these shippers is the simple one that the railroads ought to extend low rates (from New York) farther and farther into distant states until they reach the vanishing point—until the profit is absolutely eliminated. This is a theory which, no doubt, the jobbers of Southern trade centers stand ready to assist the railroads in demolishing, and very likely to the profit of both jobbers and railroads. The proposal of the commissioners to make the intra-state practice of adjoining states uniform, or even partly so, seems wholly chimerical. Uniformity of classification is desirable, of course; and uniformity in some other matters dealt with by state commissioners is also desirable; but the difficulties encountered by the railroads and by the Interstate Commerce Commission in their efforts in this direction, and their utter failure in most of those efforts, warrant the prediction that these commissioners are simply wasting their time—unless the climate of Lookout Mountain is particularly adapted to promote their health.

The Relative Economy of Stationary and Locomotive Steam Plants.

On another page will be found a letter suggesting the line of questions opened up by the very broad title of this article. The conditions under which both locomotive and stationary engines work are subject to wide variations, and a comparison such as is suggested by our correspondent can only be made in general terms. Any attempt at refinement makes it necessary to limit the comparison to a few plants for which all values are known, and when this has been done it may still be questioned whether the plants selected are representative.

A very general view of the matter, however, is not without interest. For example, the first cost of a thousand horse-power simple or compound locomotive, including the tender, may be placed at from 13,000 to 15,000 dollars, while the cost of a thousand horse-power stationary plant, equipped with high pressure non-condensing engines, will be approximately three times this amount.

Our correspondent calls attention to the fact that a locomotive does not always exert its full power, and it can be said with equal justice that the stationary engine does not always work up to its rated capacity. It will be quite fair to assume that the average power developed by a thousand horse-power locomotive including all conditions of running, will easily equal half its maximum, and it is not unusual for the average load of a thousand horse-power stationary plant to fall as low as five hundred horse-power. For example, a 250 horse-power plant, of an electric railroad, recently tested, is reported as working under conditions which at times gave it a heavy overload, but which, nevertheless, averaged a load of 80 horse-power, or but 30 per cent. of the rated power. For the purpose of this very general comparison, therefore, it may be assumed that both plants deliver power at the same rate.

Again, the number of hours during which two such plants are in operation may not be greatly different. The stationary plant, working ten hours a day and 300 days a year, runs 3,000 hours per annum, and if its average load is 500 horse-power, it performs each year 1,500,000 horse-power-hours. During the same interval the modern locomotive may run 100,000 miles, and if credited with an average speed of 33 miles an hour, it also would be in motion about 3,000 hours per annum and would deliver 1,500,000 horse-power-hours.

Up to this point the argument is most favorable to the locomotive which, while performing an equal amount of work costs but one-third as much as the stationary plant.

Passing now to the question of operation, the results become less favorable to the locomotive, but not to the degree that the popular mind often conceives. In the matter of attendance and repairs, honors are fairly even, values in individual cases varying greatly, but the amount of coal required by the locomotive is greater than that needed by the stationary plant. A simple locomotive uses from 4 to 7 pounds of coal per horse-power per hour, while a simple non-condensing stationary plant should be expected to run on from 3 to 5 pounds, values marking the minimum limits being in both cases quite reliable. Basing a comparison upon these minimum limits, it will be seen that the locomotive consumes 33 per cent. more fuel than the corresponding stationary plant. With coal at two dollars a ton the annual fuel bill for the stationary plant will be $4,500 and for the locomotive $6,000, a difference chargeable to the lower efficiency of the locomotive, of $1,500. This amount, while seemingly large, would be more than offset by a charge against the stationary plant of 5 per cent. on the excess cost of the stationary plant over the cost of the locomotive. It can therefore be maintained with much apparent reason that the larger fuel cost for the locomotive is completely neutralized by the larger interest charges for the stationary plant, and it is evident that the actual difference in the cost of power delivered by the two plants is not as great as would appear from a comparison of the fuel costs alone.

It may be noted in passing that, aided by very high steam pressures, the economy of the engines of a locomotive fully equals that of a non-condensing stationary engine, the lower performance of the locomotive as a whole being due to a lower efficiency of the boiler. This again, is not chargeable to defective design but to the fact that the locomotive boiler is necessarily small for the work it is required to perform.

The general conclusion is, therefore, that the cost of power delivered by a locomotive is not in excess of that delivered by a stationary plant of similar horse-power capacity. It may be well to here emphasize the fact that, in comparing performances, it has been assumed that the engines, both of the locomotive and of the stationary plant, are single expansion, and that those of the stationary plant have atmospheric exhaust, their type as to valve-gear, speed of rotation, etc., being unimportant. If the comparison had been based upon compound engines, the relative values would have been different, but the ultimate power investment per horse-power would have been substantially the same. It is noteworthy that such a comparison would involve the highest development of the modern locomotive, but not so in the case of the stationary plant, for, after being compounded the stationary engine can be made condensing, and the compound condensing stationary engine may in turn be made to give way to a triple expansion condensing engine; each such change opening the way for increased economy in operation. So far as can now be foreseen, these are changes through which the locomotive cannot be made to pass. As a consequence, the stationary plant, in its most highly developed form, outclasses the locomotive in its highest developed form, and gives a full performance vastly superior to that of the locomotive. The compound locomotive must have nearly 4 pounds of coal per horse-power per hour. The triple expansion condensing engine can run on 1.25 pounds; about one-third the amount required by the locomotive. Against this showing of economy must be placed the interest charges on the triple expansion condensing engine, in excess of those chargeable to the locomotive, as in the earlier comparison. When all sources of expense are included, the difference in the cost of power delivered by the compound locomotive and by a triple expansion condensing engine is surprisingly small.

Annual Reports.

Denver & Rio Grande.—The gross earnings of the Denver & Rio Grande in the fiscal year ending June 30 last, as shown in the annual report, rose above $10,000,000 in the aggregate and above $6,000 per mile, for the first time in the company's history. This total brings the revenue, for the first time, above the record of 1893, which was $9,318,000, just before the collapse of the silver mining industry in Colorado. The paralysis of industry which occurred in 1894 swept away nearly $3,000,000 of the company's 1893 gross revenue in one year and nearly half its net earnings, but indications are that the present fiscal year will equal the results set forth in the present report. The President says that "all interests and industries in Colorado are more active and prosperous than ever before." The company's recent reports have indicated that the increase in revenues of the company were in a large degree due to the growth of agricultural interests, although a recovery in silver mining and the development of new gold mines had brought the ore tonnage of the company nearly up to the figures of seven years ago, though not the revenues. The last few reports have not contained the tonnage statistics formerly given, but Mr. Jeffery's comments indicate the new revenues of the company continue to be attributable in large part to the growth of general business.

In the last year considerable narrow gage was changed to standard gage, and, in addition, it was necessary to contract for 500 standard gage box cars, 250 coal and 250 stock cars, besides 10 new standard gage locomotives and four dining cars.

The cost of these improvements and equipment was too great to be met out of the current earnings of the company to which all such charges have heretofore been made. Bonds could not be sold as the mortgages limit the issue of new bonds to new mileage, so that the company had to make special provision to secure the needed funds. To do this it sold $252,500 of its 5 per cent. improvement bonds purchased from time to time out of the yearly appropriations to the renewal fund, and in addition it sold $600,000 par value of Rio Grande Southern bonds, part of the issue turned over to the company on the reorganization of that company, and since held in the treasury. To facilitate the sale of the latter issue the company guaranteed the principal and interest of all the Rio Grande Southern bonds held in its treasury and in the renewal fund, amounting to $2,277,000 par value. Out of the proceeds of the sale of the bonds disposed of $513,000 was applied toward the cost of the standard gaging and $558,405 on the freight and dining cars, while the cost of the 10 engines, $130,161, was charged directly against income.

The new equipment gives the company for the first time more standard gage freight cars than narrow gage cars, 4,350, against 4,250.

Despite the heavy charges against income for maintenance and equipment and the sale of the treasury assets, the financial condition is materially better than in previous years. The surplus earned in the year above all charges was $1,494,461, an increase of $157,733 as compared with 1899, when the gain over the previous year had been $438,227. After deducting $946,000 for the 4 per cent. dividend on the preferred shares, $60,000 appropriated to the renewal fund, $120,000 to a fund created to write off the expenses of the bond conversion carried out a year ago and $130,161 for the new engines, the company carried a surplus of $238,300 to the credit of profit and loss. It still held in its treasury available

securities valued at $1,711,157 and its renewal fund stood at $257,830, after allowing for the deductions through the sale of securities in 1900.

Wabash.—In the fiscal year ending June 30 the Wabash increased its gross earnings by over $2,000,000, but its net only $511,000 above the 1899 figures. These comparisons are similar to those the company has been reporting for several years past. Thus in 1899 gross earnings increased $1,186,000, but net only $79,417, or, allowing for taxes and rentals, actually decreased $256,600. In 1898 the gain in gross earnings was again heavy, $1,681,000, while in net the gain was only $355,500. Some portion of these increases in gross receipts, and a larger proportion of the expenses, were due to the extension of operated mileage, this having grown from an average of 1,936 in 1897 to 2,340 miles in 1900.

The actual miles worked on June 30 last stood at 2,358, or 378 miles more than in 1897. This is mainly accounted for by the 276 miles of the Buffalo division, worked under traffic agreements with the Wabash and Erie roads since March, 1898, and by the new line to Des Moines and minor branches and connecting links in Iowa and Missouri which have been added, all with the idea of remedying certain weaknesses from a geographical and traffic standpoint, in which the Wabash was left by the reorganization of 1888. That reorganization and the events immediately preceding it stripped the Wabash of many of the divisions which had been added in previous years, and which had constituted some of the heavy burdens which brought about its bankruptcy. But while relieving it of lines which it should never have taken over for operation, the process also left the company without needed outlets to hold its traffic in competition with surrounding systems, in a highly competitive territory. The severity of the competition is evidenced by the low ton-mile receipts of the Wabash. In 1900, these were only 5.58 mills per ton-mile, which is less than the cost per ton-mile reported in 1895. In 1899 the average ton-mile rate was 5.53 mills, comparing with an average of 8.2 mills in the geographical group of states, including Illinois and Missouri, in which the Wabash operates 1,310 miles, or more than half its total.

The new outlets secured by the Wabash, first through the building of the Detroit and Chicago extension, then by the new lines to Buffalo and Des Moines, etc., together with the development of the territory along the older lines, has immensely increased the tonnage movement of the company. In 1900, for instance, the tons carried one mile reached the large figure of 1,903 millions, much the heaviest traffic ever carried over the company's lines, and no less than 527,000,000 larger than in the year of largest traffic preceding the reorganization, that is, 1884, when the company operated 1,243 miles more than in the past year.

This quick development of traffic has brought special financial problems to the company. On account of the heavy capitalization provided in the last reorganization, with the large amount of income bonds entitled to any surplus that might be earned, and the restrictions of the mortgages, preventing the issues of bonds for improvements, etc., the company has had to depend upon current revenue for funds required for betterments and the new equipment required to move the increased traffic. These have been obtainable in the last few years, and that they have been fully availed of is indicated by the increase of expenses in the last three years noted above. It is interesting to note the division of this expansion in expenses among the different items of the expense account, and this is shown below.

	1900.	1899.	1898.
Inc. in Cond. Transp.	$403,465	$411,480	$594,990
Inc. in main way	209,768	23,376	120,923
Inc. in motive power	475,888	627,085	415,811
Inc. in main cars	443,232	21,215	185,980

It will be noted that the larger share of the expansion in working charges is accounted for by the equipment department. This is explained by the efforts of the company to increase the efficiency of the equipment by the replacement of old, small capacity rolling stock with modern large capacity equipment. This is further illustrated by details of the charges to equipment expenses for 1900, which are typical of those of other years. Fifty per cent. of the engines on hand on June 30, 1899, went through the shops in the past year for general repairs, and 72 per cent. for heavy repairs. The charge for locomotive repairs, $996,770, including $197,262 paid for new engines, was $2,323 per engine.

In view of the growth of tonnage it is significant that the freight car inventory shows little change from year to year in the number of cars owned. On June 30, in fact, 400 freight cars less were carried in the inventory than in 1889, the first year after reorganization. In five years, however, about 3,600 freight cars have been bought, and 3,500 additional are now under contract. On June 30, 1899, the company owned less engines than in 1895, allowing for those scrapped. The insufficiency of equipment has hampered the company. The officers point out the results of the shortage of rolling stock, which they say was frequently 1,500 cars a day during the past year. Besides the loss of traffic statistics show how serious an expense the lack of sufficient equipment has been. "Hire of freight cars" cost $493,000 in 1899 and $480,000 in 1900 (but only $13,000 in 1895), while for passenger cars $146,600 was paid last year. The mileage of foreign cars on the Wabash road last year was nearly a third larger than the mileage of Wabash cars on its own road, and within 15,000,000 of being as much as the total mileage of Wabash cars on home and foreign roads. Moreover, the proportion of foreign car mileage to the total has been growing rapidly, increasing 80 per cent. in five years, during which time the mileage of home cars has gained only 20 per cent. The following statistics bring out the growing disadvantages of the Wabash through the lack of rolling stock:

	Home mileage Wabash cars.	Miles run per day.	Mileage of Foreign cars on Wabash.	Miles run per day.
1900	80,043,100	33	104,984,400	56
1899	75,359,700	28	100,857,700	57
1898	67,746,500	25	84,573,300	53
1897	66,779,100	22	66,317,400	55
1896	68,519,800	23	72,529,400	53
1895	67,471,100	21	64,205,300	44

The increase in the daily mileage of Wabash cars on the home road is but one instance of the greater economy with which it has been possible to operate the road from a transportation standpoint. The results may be summarized in a few figures. The average train load has been increased from 176 tons to 269 tons, and the freight train mile earnings have been raised from $1.27 to $1.50 per train mile, despite the decrease in ton-mile receipts from 7.21 mills in 1895 to 5.58 mills last year. In view of all these facts, the expectation of the officers that with the additional rolling stock now under contract in service, materially improved revenue results will follow seems justified.

Southern Railway.—The report for the year ending June 30 records extensive and important changes in all the company's operations. The exceptionally prosperous condition of the Southern States, in the development of coal and iron resources and in the extension of manufactures, results in larger gains than in any year since 1894, when the company was organized and took over the lines of the old Richmond Terminal system. The gain in gross was $5,847,184, the total revenue reaching $31,200,870. In 1895 the first full fiscal year of the present company's operations, gross earnings were only $17,959,000. In that year, however, the average miles worked were 4,391, whereas in 1900 they were 6,306. In 1895 gross revenue per mile was $4,090, while in 1900 it had increased to $4,950. The increase in average miles worked during 1900, as compared with 1899, was 929 miles, much the largest increase since the company's organization. If earnings last year are compared with the earnings of the same mileage in 1899, the increase in gross was $3,500,000, or 12.6 per cent. Nearly all of this was absorbed in increased expenses, accounted for by an expansion in all departments, so that net earnings at $9,369,423 represented a growth of only $800,119. This was sufficient after disbursing for fixed charges about $548,190 more than in the previous year, to leave a balance of $2,917,251 on the year's operations, or practically equal to 5 per cent. on the outstanding $60,000,000 preferred stock. With this exhibit of surplus, it will be seen that the directors were acting within the lines of conservative policy heretofore followed in paying only 3 per cent. dividends on the preferred shares, this being 1 per cent. more than distributed in 1899.

The company increased passenger revenue only slightly. Comparisons with 1899 were affected by the movement of United States troops in that year. Thus of the $3,505,000 increase in gross last year, on the same operated mileage, freight traffic accounted for $3,215,000, or over 18 per cent., but passenger revenue only $172,038, or 2¼ per cent. In 1899, passenger earnings, through the cause already named, increased more heavily than did freight receipts, or $1,330,000 (nearly 25 per cent.), as compared with a gain of $1,270,000 in freight traffic. Last year's gross of freight revenue represented an expansion of over 372,000,000 ton-miles, or about 20 per cent.

Average rates decreased slightly, .09 mill, but this compares with a decrease of .25 mill in 1899. Last year's decrease, however, was probably due chiefly to a change in the character of traffic carried. Most of the year's increased business came from an extension of lumber, soft coal and iron ore tonnage. Cotton tonnage, which yields good rates, fell off 134,000 tons, or 25 per cent. The total number of tons moved increased 1,889,000.

President Spencer has always laid stress upon the diversified character of the Southern Railway tonnage, and this is growing more notable from year to year. As illustrating the causes contributing to this diversification, Mr. Spencer points out the interesting fact that the increase during the year in the capacity of active cotton mills tributary to the company's lines was 13,947 looms and 507,179 spindles, the additional capital invested being about $12,500,000. In addition 21 knitting mills began operations with estimated capital of $594,000, and 14 pig iron furnaces went into blast, while a new steel mill and several iron plants were built. Altogether, 449 miscellaneous industries were established and put in operation during the year, among which may be mentioned 39 furniture factories, 30 wood-working plants, 66 lumber mills, 20 cottonseed oil mills, 29 flour mills and 7 canneries.

Capital accounts have been materially enlarged. The stock outstanding remains unchanged, but the capital liabilities were increased during 1900 by $7,051,995. There was an increase of $1,278,000 in Southern Railway consolidated bonds; $4,444,200 represents the securities of leased lines, for which the Southern Railway became responsible, and $2,141,815 consists of equipment obligations, payable in monthly installments until 1903. During 1900, $1,573,890 was paid for new equipment and directly charged against expenses or special renewal funds. The outstanding equipment obligations referred to above represent 3,200 new freight cars, the contract price of the rolling stock being $2,141,815, of which $465,819 was paid during 1900. In addition the company has under contract 83 locomotives and 3,450 freight cars.

Chicago Great Western.—The annual reports of this company always reflect the individuality of its President. They are voluminous, so that the foreign security holder, the mainstay of Mr. Stickney's enterprise since its earliest days, when reorganization and readjustment of capitalization came frequently, have obtained much general information, if they have not had dividends. This year, however, the Chicago Great Western has been able to pay dividends not only on the debenture stock, but 5 per cent. on the preferred stock A, with a balance remaining over sufficient to pay a small dividend on the preferred stock B. In the past fiscal year the gross earnings for the first time have exceeded $6,000,000, and the net more than $2,000,000. The increase in the gross earnings in the past year was 14½ per cent.; in 1899, 9 per cent. and in 1898, 15 per cent., but the gross earnings are half as large again as in 1895, while the net earnings have increased 1½ times. Most of this increase is due to enlarged freight traffic; in fact, the increase in passenger receipts is scarcely $300,000 compared with 1895 and less than $75,000 as compared with 1899 and 1893.

The company has made heavy expenditures for maintenance, particularly in the last few years of increased revenues. The improvement in physical condition, upon which Mr. Stickney has laid much stress in each of the recent reports, has undoubtedly been considerable. In the past year 169 miles of the 952 miles operated have been laid with new 75-lb. rail, and Mr. Stickney points out that the old rail taken out of the track has been sold at a profit of $10 per ton as compared with the 1899 contract price for new rail. He states that by the end of the season the entire 240 miles from Chicago to Oelwein will be relaid with new rail. Despite the low cost of rail renewals, only $15,000 for the past year, the maintenance of way expenditures equaled $880 per mile of road, the highest figure in the company's history.

Like most of the other reports which are now comin to hand the increased cost of materials is evident in the expense account, and particularly in locomotive fuel, being nearly 1 per cent. of the gross earnings. Despite the 10 new locomotives and other new equipment purchased during the year the charges for freight car mileage increased from $87,000 to $142,700, while the switching charges increased from $101,000 to $125,900.

As in other years the company's capital has been increased by sales of shares to pay for improvement work. In the past year the increase in the cost of road as carried in the company's books was $2,089,000. Of this $1,028,000 is accounted for by new side tracks, ballasting, bridges, culverts and grading, etc. Betterment work, however, accounted for the least share of the new capital raised during the year. The company, for instance, sold $3,275,500 of debenture stock to retire $2,823,150 of the so-called priority loan, a mortgage debt inherited from a previous company. A fundamental idea of the present company's financial organization is the absence of mortgage debt. While reducing prior liabilities in this way, the company increased its outstanding sterling loans over $640,000 and sold all the debenture and preferred stock formerly held in the treasury, which, on June 30, 1899, stood at $1,386,378. While, therefore, the year was a busy one for the company from a traffic standpoint with favorable revenue results, advantage was taken of a prosperous time to dispose of a good deal of new capital, the details as to which are not fully ascertainable in nearly 23 pages of the President's text which the report contains.

We have occasionally noticed the serious movement going on in the universities and colleges of the country to promote education which shall be useful to manufacturers and traders, this movement being the natural outgrowth of the recent astonishing development on that side of our national life. The latest announcement of this sort comes from the University of Vermont, which has organized a department of commerce and economics, the purpose of which is to fit young men for industrial and commercial enterprise. The studies in this special department will be in the junior and senior years, and will cover economics, English and Continental languages, history, mathematics, constitutional law, international law, physics, mechanics, banking, etc. The purpose is, naturally, to try to lay a broad basis of thorough training in languages, physical and social science and to acquaint the student, to some extent, with the details of industrial processes and business methods.

NEW PUBLICATIONS.

Data for Designing Bridges.—Messrs. Waddell & Hedrick, of Kansas City, Mo., have issued a little pamphlet, being "A List of Data Required for the Proper Designing of Railroad Bridges and Trestles," copies of which can be obtained free of charge from the office of that company. It is believed that this pamphlet will be useful to railroad men having occasion to make contracts for bridges and trestles and will result in their getting more economical structures and better ones. The pamphlet has eight pages and contains headings for many items of information, covering the location, pro-

files, grades, placing of piers, length of span, clearances, regimen of the stream, live loads for the structure, nature of foundation, cost of masonry material on the spot and much other specific information. After each heading is a blank space for convenience in filling in the replies sought.

The Journal of the Iron and Steel Institute. Vol. LVII. Edited by Bennett H. Brough, Secretary. New York: Spon & Chamberlain, 1900.

Part No. 1 of the Journal of the Iron and Steel Institute (British) for the year 1900 is received. It is an octavo volume of 518 pages, with bibliography and an excellent and copious index. The first section is Minutes of Proceedings, giving the business proceedings and papers and discussions. The second section is Notes on the Progress of the Iron and Steel Industries, which cover a great range of subjects. At the annual general meeting, held last May, the Bessemer gold medal was awarded to Mr. Henri de Wendel, who is a great iron worker in Loraine.

TRADE CATALOGUES.

Hoisting and Conveying Machinery.—The Brown Hoisting & Conveying Company, Cleveland, Ohio (26 Cortlandt street, New York, and several other cities), sends to us a new "Brown-hoist" catalogue, just issued, and a beautiful publication. It is an oblong volume 9 x 12 in., 144 pages, printed on coated paper with numerous half-tone illustrations from photographs and a few line drawings. Separate editions of this catalogue are to be issued at once in French and in German. The first part of the volume describes the hoisting and conveying machinery used at the lake ports for handling coal and ore and describes the bridge tramway plants and the "fast plant" for loading directly from vessels to cars. The second section describes cantilever and gantry cranes as used in shipyards, on the Chicago drainage channel and at various manufacturing works. Another division of the book describes coal and ore storage and rehandling plants, which have been developed on an enormous scale. Still another division describes the car dumping machine, by which the car is handled bodily, the contents being dumped into buckets or into chutes leading directly to the ship's hold. Other apparatus described is furnace hoists and stock distributors, a sewer trenching machine, cableways for conveying material considerable distances and a floating cantilever crane for the U. S. Navy. All of these are well described and illustrated.

Drop in Alternating Current Lines.—The Westinghouse Electric & Mfg. Co. issues under the above title, in pamphlet form, a reprint of an article by Ralph D. Mershon. Supplementary to this is an illustrated description of the Westinghouse type F compensator. This instrument was made on the principles laid down in the writing of Mr. Mershon. Regardless of the nature of the load, the voltage delivered to the load is indicated at the power station without the use of pressure wires. These, and other points of interest to engineers, are made clear in the first part of the pamphlet, which is given to methods of calculation. The description of the compensator includes instruction for the setting and adjustment of the instrument, with tables and examples.

Transformer Testing.—The General Electric Company issues a pamphlet of 46 pages entitled "Transformer Testing for Central Station Managers," which is to be had from the Publication Bureau of that company at Schenectady. This describes the type H transformer introduced by the company some four years ago, for which it is claimed that this is the first commercial transformer in which low temperatures, consistent with reasonable life, are guaranteed and obtained. The bulk of the pamphlet is devoted to methods of making a few simple efficiency tests of transformers, using the instruments available at a central station.

Electric Power.—A pamphlet of 135 pages, French, English, German and Spanish, with 61 half-tones, showing Westinghouse electric motors and their application to stationary work is issued by the Westinghouse Company, for the purpose of telling, pictorially, rather than by text, in what great variety of ways Westinghouse motors are used. The pages are 6 x 9 in. and the press work is excellent. The book is intended for distribution at the Paris Exhibition, but will be sent to anyone interested in the subject of electrically-driven machines.

Portable and Permanent Railroads.—Mr. Arthur Koppel, of Berlin and many other cities (New York office, 68 Broad street), sends us an album, just issued, showing the extensive use of his narrow gage and industrial railroad material. The album is 52 pages, large quarto in size and printed in English, German, French, Spanish, Dutch and Russian and well illustrated. Engravings and short descriptions show numerous installations of the well-known product of this house, giving examples as existing in all the continents of the earth.

Aerial Cableways and Tubular Despatch.—The Consolidated Telpherage Co., Broad street, New York City, issues a small pamphlet, being "Circular No. 7," describing an overhead cableway at Ampere, N. J., and telling something of telpherage in general. The circular also describes a system of sending parcels by dispatch through tubes, using electric power. This latter ingenious device has been worked out and some of the details tried in practical operation, although we do not discover that any actual installation has yet been made.

The Desrumaux Apparatus for the Purification of Feed Water for Locomotives.

This apparatus for purifying feed water is in use by the Austrian State Railroads and by the Mediterranean division of the Italian Railroads. The Western Railroad of France also has an experimental plant at St. Germain. The following description and accompanying illustration are from the report of the International Railroad Congress on the "Purification of Feed Water for Locomotives," a brief abstract of which we have already published:

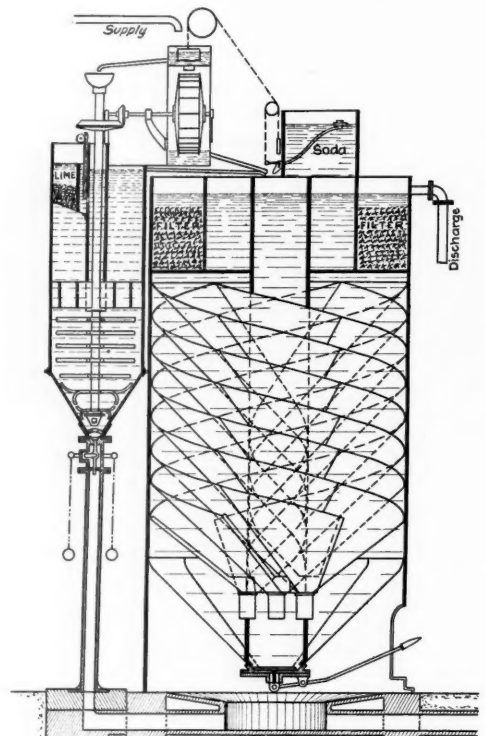
The process is based upon the use of lime and carbonate of soda. Lime precipitates the bicarbonates of lime and magnesium. Carbonate of soda gives, by double decomposition in presence of sulphate of lime, carbonate of lime which precipitates, and soluble sulphate of soda which is consequently non-incrustant.

Carbonate of soda being quite soluble in water, in order to distribute it proportionately to the volume of water to be corrected, it suffices to dissolve it in a determinate quantity in a small tank made so as to empty itself in the interval between the two chargings, which take place every 24 hours.

The only precaution necessary is to regulate the delivery of the tank used for the soda, so as to get a constant flow whatever be the level of the reagent in the tank.

In the Desrumaux purifier this result is obtained by drawing off the reagent by means of an ebonite float having fixed to it an outlet pipe into which the liquid enters under a constant pressure, as the opening by which it enters the outlet pipe is always level with the surface of the liquid.

Lime not being of constant composition, owing to the presence of stones and other impurities, the requisite quantity



The Desrumaux Apparatus, for Purifying Feed Water.

cannot be determined by weight, and it is therefore necessary in order to estimate the proper amount of lime to be added to the water to take into account its property of not being soluble in water beyond a certain proportion. In fact, water in the presence of lime, even in excessive quantities, only dissolves 73 grains per gallon. To obtain a required quantity of lime it is therefore sufficient to take a corresponding quantity of lime water.

Saturation of the water by lime is obtained by working the water up with the lime by means of a water wheel worked automatically by the water requiring purification.

The Desrumaux saturator comprises a cylindrical receiver with a conical bottom, and having in its upper part a small reservoir for slaking the lime in. In the lower part it ends in a cleaning out valve, having connected to it a pillar supporting the whole apparatus, and this pillar is also used for drawing off the spent lime.

The central portion of the saturator is traversed in its whole length by a vertical tube having paddles at its lower end. The sectional view reproduced herewith shows the central tube which serves as a shaft for mixing and at the same time introduces the water to be saturated into the bottom of the saturator. The mixer, as already stated, is worked direct by a water motor actuated by the water requiring purification.

The saturator is charged daily with the required quantity of quick lime which is slaked by the water. It then descends into the mixing cylinder through a valve which puts the slaking compartment into communication with a large pipe concentric with the central tube and ending a little above the first paddle.

The water serving for the preparation of the reagent falls by way of the cup fixed at the top of the central tube into the latter, which is provided with holes at the bottom through which the water passes into the saturator, where it is thoroughly mixed with the lime contained in the mixing cylinder. The water in rising is saturated with lime by the action of the paddles, and continuing its upward course rapidly settles, leaving behind the surplus lime, which returns to the mixing cylinder, where it is again stirred until quite dissolved. Above the paddles, fixed radiating partitions facilitate settling by checking the eddies. The clear lime water leaves by the top of the saturator and passes into the purifier, mixing with the water coming from the water motor and with the solution of carbonate of soda contained in the semi-circular tank placed directly on the purifier.

The addition of the different reagents to the unsoftened water immediately causes reactions, giving to the water a milky appearance due to the precipitation of the dissolved salts.

To complete the purification it only remains to separate the precipitates formed, together with the foreign matters contained in suspension in the water. This separation is done in the purifying apparatus.

The Desrumaux purifier is a large cylindrical receiver fixed vertically and terminating in a conical bottom having a draw off cock.

In the center of the purifier is a cylinder open at each end, round which metallic sheets are rolled so as to form an inverted conoidal helix. The purifier works as follows:

The water and purifying reagents fall into the interior cylinder called the "reaction column," and descend towards the bottom of the apparatus. Passing under the edge of the "reaction column" the water rises and is broken up among the helices.

In rising, the liquid naturally divides into distinct slices separated from one another by the heliconoidal plates in such a way that the precipitate from the upper strata may not, in settling, foul the underlying strata.

The water constantly follows the upper portions of the spaces between the helices, whilst the deposit, by reason of its destiny, falls to the lower portions, and rapidly falling on to the decantation surfaces it freely slides along them without danger of being carried off by the ascending currents.

The precipitates having settled, the conoidal form of the decantation surfaces causes them to converge towards the central parts and to accumulate at the points where the inclines are most acute, thus facilitating their movement towards the bottom of the apparatus, in order that the precipitates after traversing the helicoidal plates may not again be carried off by the running water; the lower edges of these plates are turned up so as to arrest the sediment and direct it towards small terminal pockets from which it falls through small vertical collectors into the conical bottom of the purifier, which acts as a sediment tank. To remove the sediment it is sufficient once a day to open the mud valve until clear water appears.

The water, freed from the injurious salts and foreign matters which contaminated it, finally passes through a filter of wood fiber, and issues, purified and cleared, from the top of the purifier.

When necessary, the decantation surfaces can be quickly cleared by sending a current of water into the open annular space between the filter and the inside cylinder. This water falls on the decantation surfaces, and running over their entire length removes all sediment. By means of a special system of "balanced valve" the working of the purifier is rendered automatic, so that it comes into operation or ceases to work, according as the tank of purified water is drawn upon or not, thus rendering any supervision unnecessary.

The efficiency of this apparatus may be judged by the following statement of results obtained at St. Germain:

Analysis of water.	Before.	After.
Calcium carbonate	21.56	1.26
Magnesium carbonate	7.42	3.57
Calcium sulphate	4.34	1.75
Magnesium sulphate	0.56	0.42
Alkaline chlorides and sulphates	11.62	15.61
Oxide of iron and alumina	0.42	0.35
Silica	0.70	0.56
Total scale forming matter	47.95	24.43
Total dissolved solid matter	53.20	26.18
Total hardness	66°	18.5°
Permanent hardness	44°	10.6°

Foundations of the Power Station—Boston Elevated.

BY EDGAR M. SMITH, C. E.

This power station now building is to supply power for the elevated lines on the Charlestown and Subway divisions. The remaining portion will be supplied by the old Albany power station. Its present capacity is three vertical cross-compound generating engines; two for present needs. The rating of each generator is 27,000 kilowatts, or 4,500 amperes, making a total of 54,000 kilowatts, of 9,000 amperes, as the present power and current of the plant; together with a storage battery at the Porter street incline, described in the *Railroad Gazette* of May 23.

This station is on Commercial street, and has a foundation area of 158 ft. x 140 ft., and a building area of 153 ft. x 132 ft.; allowances being made for extensions. The foundation is of Portland cement concrete. The buildings and chimneys are to be of brick, with the usual structural steel frame. The two chimneys will rise 251 ft. 6 in. above the foundation. The foundation excavation is from 14 ft. to 18 ft. in depth.

A coffer-dam was built on the harbor side of two rows of 6-in. yellow pine sheet-piling driven 10 ft. apart; the intervening space filled with puddled clay. Test borings showed uneven and interrupted strata of mud, and of hard and soft yellow clay. The excavation was by hand, with the aid of two steam derricks, carrying 60-ft. booms. Side sheeting was unnecessary, but drains carried the remaining back-water to a sump-hole at inside foot of the coffer-dam, from which it was drawn by a steam pump.

The foundation consists of spruce piling capped with concrete; 5,000 piles were driven on this site. The lengths varied from 20 ft. to 50 ft. The spacing from center to center was in general 2 ft. 4 in., except that of the first few rows outlining building and those in chimney foundation, both of which were spaced 2 ft.

½ in. All piles bearing proportionate loads were assumed to bear, as a maximum per pile, 12 tons under boiler room, and 10 tons under chimney and engine room. A test of loading was made on two groups of three piles, each with 25-ft. and 40-ft. lengths, respectively. These were proportionately loaded with granite blocks on a triangular platform, giving a total load of 110 tons on three piles, or 36.6 tons per pile, the result being that no effect was produced on the 40-ft. group, nor on two piles of the 20-ft. group. The remaining one settled .02 of a foot over night, but no further settlement took place thereafter. This pile is one of exceptionally small diameter, both at top and bottom. All piles were classified according to minimum allowance relative to location per top and bottom, as 6 in. x 10½ in. and 7 in. x 12 in. In the chimney area of 105 ft. x 60 ft., only the 7-in. x 12-in. stock was used. Here the cut-off of piles was at elevation—1.0, which is four feet lower than the surrounding area of foundation.

The method of placing the concrete was as follows: First, a 6-in. bed of broken stone was spread 1 ft. below top of piles; this was covered with a 1-in. layer of sand, and rammed; on this preparation the concrete in the proportion of 1 : 2 ½ : 5 was laid to a depth of 6 in. above top of piles, then a 1-in. layer of waterproofing plaster in the proportion of 1 of Portland cement to 1 of sand was applied; above this level concreting and waterproofing were used in alternate but unequal layers to the floor surfaces at elevation 8.0 and elevation 10.5. The Portland cement concrete used in the boiler and engine room areas is made in the two proportions of 1 : 2 ½ : 5 and 1 : 3 : 6, respectively. The mixture was laid in layers not exceeding a depth of 4 in. per layer, and these were well rammed, each successive layer bonding with the one below. In the way of waterproofing the entire outer surface of foundation is plastered with a ½-in. layer of Portland cement in one continuous surface, and over this is a thick surface of asphalt. The south side of foundation adjoins a stone foundation wall, and along this a 4-in. core wall was formed of cement plaster for waterproofing.

The interior steel posts of superstructure are to be supported on concrete piers in boiler room basement. These piers are of different dimensions, as 13 ft. x 9 ft. and 9 ft. x 9 ft., varying according to simple and double grouping of posts. The posts are held in place by 1½-in. bolts 5 ft. long and mostly embedded in wall. Directly under all piers are sets of 60-lb. steel rails embedded in the concrete 6 in. above top of piles, to perfect the distribution of the loads over special grouping of piles. Under the chimneys these rails were laid in two adjoining tiers and spaced in squares of 2 ft. ½ in. C. to C. but under the piers they were laid only in one tier, and were spaced in sets of three with 14-ft., 11-ft. and 4-ft. lengths at distances of 6¾ in., 13½ in. and 27 in. C's to C's. The total amount of rail laid in foundation is 5,845 ft. in chimney area, and about 3,000 ft. in other pier areas. The loads that these individual piers are to carry vary from 125 to 350 tons each, relative to their size.

The chimneys are to be of equal dimensions, and have a base 100 ft. high with a maximum area of 33 ft. x 29 ft. and minimum area of 28 ft. x 24 ft.

The inside diameter is 13 ft., remaining the same to the top, and the head 21 ft. 6 in. in diameter. The total batter on the outside of the cylinder portion of chimney is 8 ft.

The engine-beds are built entirely of brick, standing by themselves 18 ft. in height with their base dimensions of 42 ft. x 32 ft. They differ in details relative to make of generator. These mammoth generators stand to the height of 30 ft., and are of the General Electric and Westinghouse make, each with a shaft of 37 in. in diameter. The construction is under the direction of Mr. George A. Kimball, Chief Engineer, and Mr. O. S. Heyer, Resident Engineer.

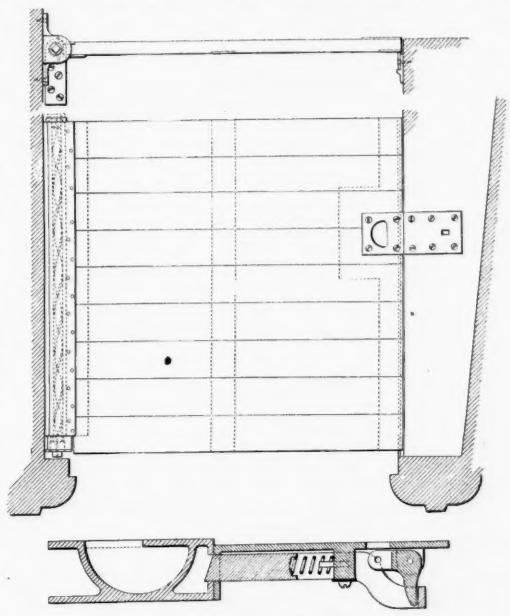
Iron Ore Production in the United States in 1899.

The production of iron ore in the United States in 1899, according to the annual report of the United States Geological Survey, amounted to 24,683,173 long tons, which was 5,249,997 tons, or 27 per cent. in excess of that produced in 1898. The records for 1898 and 1899 represent the largest output of iron ore mined in any country in one year, the nearest approach being a total of 13,062,040 tons mined in 1880 in England. Twenty-four states contributed to this total, Michigan leading with 9,146,157 tons; Minnesota is second with 8,161,289 tons, Alabama third with 1,009,327 tons. The iron ores have been subdivided into red hematites, brown hematites, magnetite and carbonate. The red hematite continues to be the most prominent of the classes of iron ore, contributing 20,004,299 tons, or 81 per cent. of the total for 1899. Of the brown hematites, 2,869,785 long tons were mined, or 11.63 per cent. of the total production, while the magnetite output amounted to 1,727,430 tons, and that of the carbonate variety to 81,559 tons. The Lake Superior region increased its maximum output of 13,779,308 tons in 1898 to 17,802,955 tons in 1899. The total value at the mines of the iron produced, as reported by producers, was $34,999,077, or $1.42 a long ton, an increase of 28 cents, or 24.6 per cent. over the average value of $1.14 a long ton, as given in 1898. The highest average value of iron ore at the mines is for the State of New Jersey. The lowest average cost, 90 cents a ton, was in Texas, where part of the iron is obtained by convict labor.

The Seymour & Kahler Platform Trap-Door.

Patents were granted on the Seymour & Kahler extension platform trap-door, Aug. 24, 1899, and subsequently assigned to Mr. O. M. Edwards, Syracuse, N. Y. At this writing the door is in use on first-class trains of five large railroads. The drawings of plan and detail accompanying this description make its simple operation plain.

The principle employed is the twisting of two flat bands of spring steel ⅛ in. x ⅝ in. x the cross width



The Seymour & Kahler Platform Trap Door.

of the trap hinge ,to a torsion that is at its maximum when the door is shut down. The spring power is sufficient to steadily lift the door to a vertical position; or to rest against the end of the car body, when the latch is released. The latch is placed on the end sill, and is released by the downward pressure of a release connection to the bell-crank, shown in detail. The desired tension of the lifting springs is obtained by preliminary turning of the spring carrier. This normal set is retained by a small rag-wheel, or dog, that engages with stops provided to engage its concaved teeth.

Increase of Axle-Load on Railroad Rolling Stock.

Mr. Rudolf Sanzin has just published, in an Austrian contemporary, an article on the above subject, from which we extract the following:

"The increase of the admissible axle-load on railroad rolling stock would be the simplest and best means of improving the efficiency of railroads and their rolling stock. Several administrations are already in a position to admit a greater axle-load than that at present prescribed by the Verein Deutscher Eisenbahn-Verwaltungen, which is 14 tons, say 15,000 lbs. per journal. With this end in view they have already strengthened the roadbed, and, to some extent, introduced a heavier rail section. More than 40 years ago the axle-load on quite a number of the railroads of Middle Europe was 14 tons, the gage was about the same as to-day, and the outside measurements of the cars was about the same.

Let us, in the first place, consider the advantage of increasing the axle-load of railroad cars. At the present time the maximum total weight of a loaded two-axle car is 28 tons.* The French Northern has covered freight cars of 20 tons carrying capacity and 8 tons dead weight, and similar coal cars of 7.6 tons dead weight. Both kinds are two-axled. As a rule, however, this limit is seldom reached. The heaviest load of two-axle cars is reckoned at about 15 tons, while the dead weight varies from 7 to 10 tons. The full carrying capacity of covered freight cars is employed only in the case of heavy goods. It is desirable to employ the highest possible carrying capacity for all goods alike, as the increase of dead weight is insignificant in proportion to the increase of carrying capacity, seeing that frames, axles and wheels do not call for special strengthening. Therefore, it is that cars with greater carrying capacity generally show more favorable comparisons between carrying and dead weight than those with smaller carrying capacity. The following examples of dead weight and carrying capacity of two-axle, covered freight cars, without brake, confirm this assertion:

10-ton carrying capacity, 6.8 tons dead weight, for 1-ton carry. cap., 680 kilos (1,499 lbs.) dead weight.

12.5-ton carrying capacity, 7.1 tons dead weight, for 1-ton carry. cap., 560 kilos (1,235 lbs.) dead weight.

15-ton carrying capacity, 8.7 tons dead weight, for 1-ton carry. cap., 513 kilos (1,131 lbs.) dead weight.

The increase of the axle-load would be generally advantageous, and particularly in the transportation of coal and iron ore, as the cars which are at present used for this purpose are not so constructed as to permit the economical utilization of the space, and the dead weight of the cars counts all the more as they are returned empty. As, on many of the leading lines, the transportation of coal is one of the chief items, and, as the great number of the cars and the great length of the trains renders the traffic especially heavy, any remedy should be very welcome.

It is only recently that suitable iron cars have been built with a greater loading capacity. If the price of coal is not to be considerably increased it will be absolutely necessary to proceed along these lines, and to build cars, the loading capacity of which must be much greater than at present, in order to keep within due limits the cost of transportation. The so-called "vord" cars which are at present employed have generally a loading capacity of from 10 to 15 tons, and their dead weight is comparatively high. Some details of such cars, which may be of interest, are given herewith:

Loading capacity (tons)	10	12	15	20
Dead weight (tons)	5	5.9	7.2	7.6
Kilos for 1 ton of load, dead weight	500	491	484	380

The following figures give the greatest admissible axle-loads of certain leading railroads, as well as the locomotives in use:

Companies.	*Greatest Axle-load.* Tons.	*Type of Locomotive.*
Most of Austrian private railroads	14.00	Almost all types.
Austrian State railroads	14.50	All new locomotives.
Prussian " "	15.00	2-4 coupled express.
Saxon " "	15.00	Coupled.
Baden " "	15.00	Coupled.
Palatinate "	15.00	2-5 coupled express.
Gothard Railroad	15.00	3-5 " mountain exp. loco's.
Jura Simplon Railroad	15.00	¾ coupled mountain express locomotives.
French Northern "	15.25	2-4 coupled express.
Paris-Lyon-Mediterranean	15.70	" " "
Highland Railroad	16.00	" " "
French Western Railroad	16.40	" " "
French Southern "	16.50	" " "
Boston & Albany "	17.50	" " "
Lancashire & Yorkshire	17.80	2-5 " "
London & North-Western	17.80	2-4 " "
Illinois Central	18.10	" " "
Great Western	18.30	¼ " "
South-Western	18.30	2-4 " "
Belgian State Railroad	18.30	" " "
Erie	18.90	3-5 coupled mountain express.
Midland	19.00	¼ coupled express.
North-Eastern	19.00	" " "
Great Northern (U. S.)	19.50	4-5 coupled mountain.
Pennsylvania	19.80	" " "
Great Eastern	20.00	¼ coupled express.
Pennsylvania	21.50	2-4 " "
Philadelphia & Reading	21.80	2-5 " "

*Metric tons, wherever mentioned—2204.6 lbs.

TECHNICAL.

Manufacturing and Business.

Mr. J. W. Gardner, General Sales Agent of the Sargent Co., has resigned to become associated with Mr. E. C. Darley, Chicago, Western Agent of the Aultman & Taylor Machinery Co., maker of Cahall vertical boilers and Babcock & Wilcox tubular boilers.

The Rand Drill Co., of New York city, has been awarded a grand prize and three gold medals for its exhibit at the Paris Exposition.

N. C. Dean will not represent the Carbon Steel Co. after Sept. 1, but will continue his connection with the Lowe Brothers Co. railroad paint business.

Iron and Steel.

J. S. Elverson has resigned as Superintendent of the Empire Steel & Iron Co., at Oxford, Pa.

The rod, wire and nail mills of the American Steel & Wire Co. in Anderson, Ind., was shut down Aug. 31.

The skelp mill of the Reading Iron Works, which closed about 10 weeks ago, resumed operation Aug. 29.

Three mills owned by the American Steel & Wire Co., in Cleveland, Ohio, which were closed June 1, resumed operations Sept. 4.

The West Virginia Bridge & Construction Co. has been incorporated in New Jersey, with an authorized capitalization of $500,000.

The Marion Malleable Iron Works has been incorporated by W. P. Gurley, G. A. Bell, J. C. Haswell and others of Marion, Ind. The capital is $75,000.

The stockholders of the Sharon Steel Co., on Oct. 11, will consider increasing the capital stock by $1,500,000. The new plant is expected to be in operation by the first of next year.

The Virginia Iron, Coal & Coke Co. has shut down its iron furnace at Bristol, Va., and also the one at Embreville. The Cambria Steel Co. has shut down its plant at Johnstown, Pa.

William A. Cornelius, heretofore Superintendent of the structural mills of the Homestead Steel Works of the Carnegie Co., has been appointed Superintendent of the rolling mills department of the National Tube Works at McKeesport, Pa.

Holding Power of Boiler Tubes.

The Locomotive for July, in an article on "Short Pipes in Sectional Boilers," gives some figures on the holding power of tubes, reprinted from tests made by J. M. Allen. The stress at which tubes yielded when expanded, but neither flaxed nor beaded, is given at from 5,000 lbs. to 7,500 lbs. The same sized tubes, expanded and flaxed at their ends, held from 19,000 lbs. to 20,500 lbs. The article contains, aside from this, some valuable pre-

cautionary references to the manner of making and maintaining joint work in sectional stationary boilers.

Electric Traction on the Berlin Metropolitan.

The Union Electrical Co., of Berlin, has submitted a project for electrifying the Metropolitan Railroad of that city. It is proposed that the trains shall be made up of eight motor cars, each with four axles, these to run at two-minute intervals. With 30 seconds stops at the stations it is expected to have a commercial speed of 50 kilometers an hour. Furthermore, it is suggested that trains of 12 cars may be run as well as trains of eight, increasing the present carrying capacity of the Metropolitan 260 per cent. Each car will have two motors of 175 h.p., giving for an eight-car train 2,800 h.p. The locomotives now in service can develop but about 400 h.p. The current would be carried on a third rail. There would be 38 sub-stations, and at each one of these would be storage batteries connected directly to the contact rail. It is estimated that the cost of this installation would be about 43,000,000 marks, and that the cost of operation would be reduced 28 per cent., as compared with the present working.

Report of Air-Brakes. N. C. & St. L. Ry.

We are in receipt of the report of the condition of air-brakes on cars entering and leaving Nashville yard during the month of July. For some time past Mr. J. W. Thomas, Jr., the General Manager of the Nashville, Chattanooga & St. Louis, has been compiling these monthly statements, a number of which we have published from time to time.

Of the cars entering Nashville yard during July, 198 had the brakes cut out, the division of this number being 154 Westinghouse, 30 New York, 8 Landsberger, 5 Boyden and 1 Crane brake. The brakes of the last three makers were cut out on account of the triple valves blowing at the exhaust port. The reasons for cutting out the Westinghouse and New York brakes are given below. It will be noted that the number of cars cut out on account of Westinghouse triple valve defects was 0.8 per cent. of the number of Westinghouse cars handled, while the New York triple valve defects were a little more than 3 per cent. of the total cars fitted with that brake.

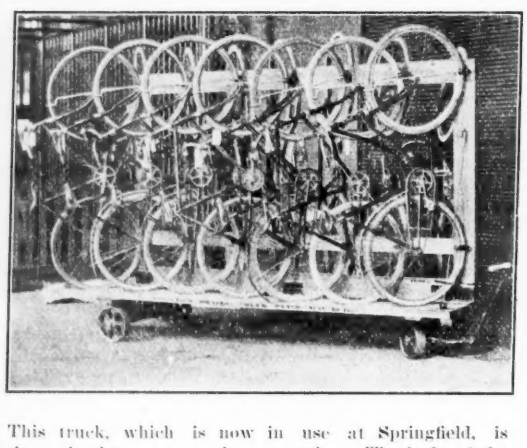
	Westinghouse.	New York.
Brake rigging out of order	10	2
Blowing at exhaust port	60	20
Train pipe bursted	3	
Release valve leaking	22	
Branch pipe broken	5	
Check valve case gasket blown out	15	
Cylinder piston broken	1	
Cylinder release spring broken	1	
Triple valve gasket worn out	11	
Union gasket worn out	14	2
Leather gasket in bad condition	1	
Sand hole in triple valve body	1	
Auxiliary reservoir broken	1	
Sand hole in auxiliary reservoir	2	
Piston packing ring broken	4	
Graduating stem, nut and spring gone	1	
Brake shoe and head gone	2	
Blowing at vent port	—	3
Triple valve body broken	—	1
Piston packing leather in bad condition	—	1
Check valve broken	—	1

There were 8,306 air-brake cars forwarded from Nashville, of which 90 had the brakes cut out, there being on an average 18 serviceable air-brake cars per train. The division, according to the maker, of air-brake cars forwarded is: Westinghouse, 7,560; New York, 724; Landsberger, 10; Boyden, 8, and Crane 4. Of the 90 cars cut out, 47 belonged to railroads and 43 to private car lines, and the following list gives the reasons for these brakes not working:

Blowing at exhaust	Westinghouse	14
	New York	14
	Landsberger	8
	Boyden	5
	Crane	1
Blowing at vent ports—New York		3
Check valve case gasket blown out—Westinghouse		8
Triple piston snap ring broken		4
Triple valve body broken		1
Sand hole in triple valve body		1
Auxiliary reservoir broken		1
Blow hole in auxiliary reservoir		2
Release valves leaking		6
Brake cylinder piston broken		1
Cylinder release spring broken		1
Cylinder packing leaking		2
Train pipe broken		3
Branch pipe broken		3
Brake rigging out of order		12

Whitcher's Bicycle Truck.

Frank W. Whitcher & Co., of No. 4 High street, Boston, have lately made for the Boston & Albany a truck to be used by station baggagemen in moving bicycles.



This truck, which is now in use at Springfield, is shown in the accompanying engraving. The body of the truck is 10 ft. long, and it will hold 14 bicycles, any one of which can be taken off without disturbing the others. The usefulness of a truck of this kind at a large station is too obvious to need mention.

Bids for a San Francisco Dry Dock.

The Board of Directors of the San Francisco Dry Dock Co., 302 California street, San Francisco, Cal., wants bids until 11 a. m., Oct. 8, for furnishing the material and building a dry dock at Hunter's Point, in accordance with plans and specifications on file in their office. W. F. Russell, Secretary.

Interlocking.

The Taylor Signal Co., Buffalo, N. Y., has taken the contract for a large interlocking plant at Clark and 16th streets, Chicago. This is a complicated group of crossings used by the St. Charles Air Line, the Illinois Central (Omaha line), the Lake Shore & Michigan Southern and the Chicago, Rock Island & Pacific.

THE SCRAP HEAP.

Notes.

The Michigan Central has rejoined the Buffalo Railroad Clearing House.

At the joint agency of the Central Passenger Association in Clark street, Chicago, last Saturday, about 20 persons were considerably injured by a crush, when a large crowd struggled to get their return excursion tickets validated. The occasion was the encampment of the Grand Army of the Republic.

Hereafter engine wipers taken into the service of the Atchison, Topeka & Santa Fé will be examined the same as candidates for firemen; or on a sufficient number of the points prescribed for firemen to give satisfactory evidence that the person employed will be a suitable man to promote to the position of fireman.

Traffic Notes.

The New York Central announces that for the heaviest and most important trains, reservations of berths in sleeping cars, and chairs in parlor cars will hereafter expire two hours before the time the train leaves. If reservations which have been made are not paid for at that time the company will be at liberty to sell the seats or berths to new customers.

Rates on grain by lake from Chicago to Buffalo were advanced slightly last week in consequence of scarcity of vessels, and it is said that this scarcity is due to the troubles which vesselmen have in the Chicago River since they have had difficulty, on account of the strong current, in avoiding doing damage to the bridges. The rate per bushel on Saturday was 1⅜ cents, with a prospect of an advance to 1½ cents.

The General Passenger Agents of the principal railroads west of the Missouri River held a meeting at Glenwood Springs, Colo., Aug. 30 and 31 and Sept. 1 and 3, and report that they have formed an association. Their agreement is subject, however, to the approval of the meeting of executive officers, which will be held in New York city Sept. 18. The plan as outlined will be printed and distributed to the 21 roads interested.

The local committees of traffic officers, which the last meeting of Western Presidents provided for, and which were to deal with rate questions at St. Louis, Kansas City, Omaha, St. Paul and other cities, appear to have been decidedly unsuccessful. Several of the men chosen to act as Commissioners or chief officers declined the places, and at St. Paul the attempt to formulate an agreement and establish a committee has been abandoned for the present.

Locomotives for Europe.

The Belgian State Railroads are shortly to be in the market for 70 locomotives. It appears that Austrian, English and German locomotives have not altogether given satisfaction so far as recent supplies are concerned, and there is a likelihood that the order will be given to Belgian works. It is stated in some quarters that German locomotive builders are so crowded with work that orders will have to be passed on to America for execution. Fifteen hundred engines per annum is the present estimated limit of the output of German works, but only last December the Prussian State Railways ordered 580 locomotives and 8,000 goods trucks, while orders for 800 more locomotives are to be held over until the next budget. In Saxony, we read that 17,000,000 marks have been demanded from the Diet for the purchase of locomotives and cars, and a further 51,000,000 marks for the building of railways.

Equipment Notes From the Wabash.

From the latest annual report of the Wabash it appears that during the last year, three passenger cars were equipped for Pintsch gas, making a total of 115 cars now so equipped on that road. One hundred and sixty-eight cars were equipped with the Gold system of steam heating, making 272 now so equipped. Automatic couplers were applied to 1,639 freight cars, and air-brakes to 622. This does not include couplers and brakes for new equipment. All of the freight equipment of the road is now supplied with automatic couplers and about 51 per cent. with air-brakes. In March of this year contracts were made for 3,000 30-ton box cars and for 500 40-ton coal cars, all to be delivered by Sept. 1. These have steel bolsters, air-brakes, automatic couplers and metal draft rigging.

Paris Notes.

The Crescent Steel Co. received the grand prize at Paris, and Messrs. Gould & Eberhardt, of Newark, received a silver medal for their machine tool exhibit.

Disastrous Collision at Hatfield, Pa.

On Sunday morning, Sept. 2, about 6:55, there was a rear collision of southbound passenger trains on the Bethlehem branch of the Philadelphia & Reading at Hatfield, Pa., in which 13 persons were killed and 30 or more injured. There was a dense fog at the time. The foremost train (a milk train) was standing at the station, and was about on time. The second train was an excursion, bound for Atlantic City, and consisted of 10 cars. The two passenger cars at the rear of the milk train were crushed, but these contained few passengers; four of these were killed. The six foremost cars of the excursion train were badly wrecked, the first one being broken in two. Nine persons were killed in the first two cars.

A few scraps of evidence are printed in the newspapers. The excursion train left Bethlehem 35 minutes behind the milk train, but it made few or no stops. The prescribed time interval between all trains is five minutes, and flagmen at highway crossings, as well as station agents, are required to maintain it; moreover, the stations north of Hatfield, for 10 miles, are only about two miles apart. Yet it appears that the excursion reached Hatfield only about two minutes after the milk train.

The *Philadelphia North American* says that James Benner, crossing flagman on the Reading Railroad, at Souderton (2½ miles above Hatfield), made the following statement:

"The milk train passed through this station at 6.47¼ this morning, on time, and I stuck my red flag into the hole in the planking in the middle of the south-bound track, according to regulations. The rule is to keep the red flag flying for five minutes after a train passes.

"Just one minute and three-quarters later, at 6:49, I saw the excursion come down the grade, through the cut at 'flyer' speed. I knew that the train would crash into the milk train before it reached Lansdale. * * *

"I looked up at the signal board operated from the tower at the station, and was surprised to see that it was not set to stop the train. Then I looked toward the station, expecting the operator to come out with a green flag, which would signal the express to go slowly. But he did not appear.

"The excursion came thundering along without the slightest slowing down, and the engineer leaned out of the cab window and waved his hand four times at me, motioning me to take the flag away.

"But I waited until the train was about on top of me before I snatched the flag away, and the train went by at a speed of fully forty miles an hour. I did not step back so far for way and suburban trains as for flyers, and, not appreciating the speed of the excursion, I did not step back far enough, and nearly got sucked into the flying train.

"I was horrified at the danger. * * * There was a pretty thick fog. I ran over to Beidler, the operator, and asked him why he had not stopped the train. He said he had no orders to show the signal; that the train despatcher at Philadelphia was running the train, and that, if he wanted it stopped he would have wired him to do so. I remarked that we would hear from that crazy excursion, and left. Five minutes later we got word of the smash-up.

"I wish now I had left my flag sticking between the tracks, so that the engine would have to smash the stick. But engineers often, on the down grade, can't stop before reaching the flag, and they motion me to take it away, and come to a stop a few feet further down the track."

The Superintendent makes a statement indicating that the despatcher was negligent in not holding the excursion train at Souderton until the milk train was side tracked.

LOCOMOTIVE BUILDING.

The Cuban Central has ordered four engines from the Baldwin Locomotive Works.

The Cincinnati, Richmond & Muncie, now building, has ordered two engines from the Manchester Locomotive Works.

The U. S. Government has ordered from the H. K. Porter Co. one compressed air locomotive for use on Ionia Island, N. Y.

The Wisconsin Central has ordered 10 10-wheel freight engines from the Brooks Locomotive Works. They will be built from standard designs of the road for engines of that class.

CAR BUILDING.

The Colorado Midland has ordered 100 stock cars from the Pullman Co.

The Mount Vernon Car Co. is getting prices on materials for 300 cars.

The Grand Trunk has ordered 300 box cars from the American Car & Foundry Co.

The Chicago, Rock Island & Pacific has ordered two baggage cars from the Pullman Co.

The Wilson Lumber Co., Wilson, W. Va., is in the market for some logging cars for a 3 ft. gage road.

The Missouri Pacific has ordered from the American Car & Foundry Co. the 500 flat cars referred to Aug. 17.

The St. Louis Southwestern is reported in the market for 1,000 freight cars. We have no official information.

The New Zealand Government Railroads have ordered 68 cars for passenger service from the American Car & Foundry Co.

The Atchison, Topeka & Santa Fe has ordered the 500 refrigerator cars referred to Aug. 24 from the American Car & Foundry Co.

The Portland & Rumford Falls has ordered 25 self-clearing, hopper, steel coal cars of 100,000 lbs. capacity from the Pressed Steel Car Co. They will be similar to those built for the Erie.

The New York Central & Hudson River has asked bids on 500 box cars, but no order will be given until after the next meeting of the Board of Directors, the time of which has not yet been decided.

The Choctaw, Oklahoma & Gulf is said to be in the market for 1,000 box cars of 60,000 lbs. capacity and to have bought 100 cars from the Pittsburgh, Fort Wayne & Chicago. We have no official information.

BRIDGE BUILDING.

Appleton, Wis.—The Chicago & Northwestern and the Chicago, Milwaukee & St. Paul railroads have applied to the War Department for permission to build a joint bridge over Fox River. It will be a plate girder bridge 652 ft. long. (Construction Supplement, p. 562.)

Biloxi, Miss.—Bids are wanted by the Mayor and Board of Aldermen, until Sept. 14, for a combination bridge over Back Bay, estimated to cost $17,000.

BOSTON, MASS.—Local reports state that Mayor Hart, at the next meeting of the Board of Aldermen, will recommend a loan of $680,000 for rebuilding the Congress street and the Mount Washington avenue bridges. Work on the Congress street bridge is estimated to cost $480,000, and the Mount Washington avenue bridge $200,000.

CHESTER, PA.—The Philadelphia & Delaware Street Ry. Co., and the Prospect Street Ry. Co. have permission from the County Commissioners to build two bridges in the county—one over Darby Creek and the other over Crum Creek, both on Island Road. The Darby bridge will be 480 ft. long, including approaches and draw. The Crum bridge will be 100 ft. long. Both bridges will be 26 ft. wide.

CHICAGO, ILL.—Reports state that bids will soon be wanted for the proposed bascule bridge over the north branch of Chicago River at Clybourne Place. Estimated cost, $200,000.

COSTA RICA.—Congress recently authorized bridges over the Tempisque and Las Canas Rivers, in the canton of Santa Cruz, Province of Guanacaste.

DALLAS, ORE.—The County Court of Polk County will receive bids until 1 p. m., Sept. 7, for the following bridges: 72 ft. span and approaches across Mill Creek, 100 ft. span and approaches across Luckiamute River, 100 ft. span across Luckiamute River, 72 ft. span across Luckiamute River, 45 ft. span and approaches on Hall's Ferry road, 30 ft. span and approaches near Parker Station. U. S. Longhary, County Clerk.

EATON, OHIO.—Reports state that the county proposes to issue $17,000 of bonds for new bridges. O. A. Gale, County Auditor.

FRANKFORD, IND.—The Toledo, St. Louis & Western will, within the next 12 months, spend about $200,000 in rebuilding and strengthening of bridges. A. Shane, Superintendent of Bridges and Buildings.

FREDERICTON, N. B.—The Department of Public Works wants bids for the following work: Highway bridge at Salisbury, Westmoreland County; Gullivar bridge, Bas du Vin, Northumberland County; Molasses Hill bridge, Upper Blackville, Northumberland County; Dunlap bridge, Gloucester County; McIntosh bridge, Gloucester County; Indian bridge, Madawaska County; Rolph bridge, North West Miramichi; Northumberland County and Long Marsh Creek bridge, Riverside, Albert County.

GREENVILLE, S. C.—Bids are wanted, according to report, until Sept. 13, for a bridge at the Keeler bridge site. J. E. Seegle, Supervisor.

HARRISBURG, PA.—Reports state that bids are being received for a bridge over Mulberry street, to cost about $15,000.

HONESDALE, PA.—The covered bridge over the Lackawaxen, at Fourth street, has been condemned. Reports state a new bridge will be built.

KANSAS CITY, KAN.—The Metropolitan Street Ry. Co. is about to make improvements to the bridge on Minnesota avenue over the street railroad on Sixth street.

MALLORYTOWN, ONT.—J. F. Kelly wants bids for a bridge at Larne's Mills, in Front Township.

PITTSBURGH, PA.—The Secretary of War has approved the plans for rebuilding the South Tenth street bridge across the Monongahela River. The new plans provide for a steel bridge of five spans, of a total length of 1,420 ft., to cost about $400,000. Geo. W. Wilson, Director, Department of Public Works.

The Pittsburgh, Virginia & Charleston, the Monongahela Division of the Pennsylvania, will build two steel bridges—one near Baldwin, four miles from Pittsburgh, and the other at Hays Station, near West Homestead.

The Wheeling & Lake Erie will build a 100 ft. through plate girder bridge, two 45 ft. deck plate girders, and three 154 ft. through Pratt trusses on its main line.

PORTSMOUTH, VA.—The Seaboard Air Line will build a bridge across Tarrara Creek.

READING, PA.—We are informed that only some of the smaller bridges on the Reading Belt R. R. have been contracted for. The company is not ready to receive bids for the principal bridges. (Aug. 31, p. 587.)

REGINA, N. W. T.—Bids are wanted for a bridge over Oliver's Creek, until Sept. 15, by J. S. Dennis, Deputy Commissioner, Public Works Department, Regina, N. W. T.

Bids are also wanted, Sept. 15, for a bridge over Fulton's Creek, in Edmonston Settlement.

The Commissioner of Public Works wants bids, Sept. 15, for a bridge at Crewhots Crossing over the Sturgeon River.

SCRANTON, PA.—Local reports state that the Lackawanna R. R., and the Scranton Ry. Co., have agreed to build the proposed West Lackawanna avenue viaduct, which is to cost about $167,000. It will be about 720 ft. long, between Seventh and Ninth streets. City Engineer Joseph P. Phillips informs us that nothing definite is decided.

SOUTH BEND, IND.—Thomas Bridges' Sons, of Wabash, Ind., have the contract for the stone work, at $24,000, for a new bridge over St. Joseph River at South Bend.

STELLARTON, N. S.—The Town Council is considering building an iron bridge in the south end of this town.

TAMPA, FLA.—The Board of Public Works will soon want bids for some bridge work.

TERRE HAUTE, IND.—The Terre Haute & Wabash (Electric) R. R. will need three bridges of the following lengths: 70 ft. 76 ft. and 80 ft. J. R. Kendall, President: George Grimes, Engineer.

VERSAILLES, KY.—The Louisville & Atlantic R. R. will need two bridges, 100 ft. each. Address C. M. Browning, Superintendent.

WALLINGTON, N. Y.—The State Board of Railroad Commissioners has authorized the Rochester & Sodus Bay Ry. Co. to build an under grade crossing of the Rome, Watertown & Ogdensburg near Wallington.

WATERFORD, N. Y.—The village trustees are considering building a bridge across the Hudson River at Broad street.

WATERLOO ONT.—The Council has decided to build an iron bridge on King street.

WATERTOWN, N. Y.—The bridge proposed by the New York Central over Arsenal street, will be of steel, about 780 ft. long, and will cost about $33,000. The Railroad Commissioners, on Aug. 29, authorized it. (Aug. 24, p. 573.)

WEST SENECA, N. Y.—The State Board of Railroad Commissioners has authorized the South Buffalo Ry. to make overhead crossings on the Hamburg turnpike in the town of West Seneca, and in the town of Hamburg.

Other Structures.

BUFFALO, N. Y.—The West Shore has let a contract to Leh & Co., Buffalo, for a dock and trestle on Blackwell Canal, at the foot of Michigan street. The dock will be 180 ft. long. The company is building a freight house and roundhouse at Jefferson and Swan streets.

EL PASO, TEX.—The shops of the Southern Pacific, at Tucson, Ariz., will be removed to El Paso some time in the near future.

INDIANAPOLIS, IND.—Plans are reported finished for a new freight depot by the Pennsylvania Co. in Indianapolis.

MOLINE, ILL.—Peter Peterson has the contract for the new freight depot on Third avenue, in Moline, for the Davenport, Rock Island & Northwestern, at $10,000.

MONTREAL, CAN.—Reports state that bids are asked, by W. J. Connors, of Buffalo, to carry on the work of building the 5,000,000 bu. grain elevator in Montreal Harbor.

NELSON, B. C.—The plans for the new freight sheds for the Canadian Pacific, at Nelson, are finished. The building will be on the south side of Baker street, adjoining the passenger station. It will be 225 ft. long and 40 ft. wide. (June 1, p. 363.)

SIOUX CITY, IOWA.—The Union Terminal Ry. Co. will soon put up two warehouses in this city. W. Stevenson, General Manager.

WEST ORANGE, N. J.—We are informed that the Erie R. R. does not contemplate building a new passenger station at West Orange, as reported in this column Aug. 24.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

Southern and Southwestern Railway Club.

The following are the papers presented before the club at the meeting held in Atlanta Aug. 9: "The Best Mode and Coupler to Be Used in Double-Heading Engines in Freight Service," reprinted elsewhere in this issue, and "The Cost of High Speed Trains." The next meeting of the club will be held in Atlanta Nov. 8.

American Street Railway Association.

A list of the papers to be presented at the convention to be held in Kansas City Oct. 16–19 was given in the *Railroad Gazette*, Aug. 24, p. 573. The headquarters of the association will be at the Midland Hotel. Friday, Oct. 19, is set apart for the examination of exhibits. The annual banquet will be held that evening, when the officers elected will be installed.

American Association of General Passenger and Ticket Agents.

The annual meeting will be held at Buffalo, N. Y., on Oct. 16. The subjects to be considered are: "Enlargement of the Usefulness of the Association," E. A. Ford, Chairman of committee. "Issuance of Compendium of Passenger Rates and Divisions," Warren J. Lynch, Chairman of committee.

American Society of Civil Engineers.

The August Proceedings of the American Society of Civil Engineers give a brief record of the thirty-second annual convention held in London, most of which has already been presented to our readers.

The Nominating Committee was elected as follows: District No. 1, N. P. Lewis; District No. 2, F. P. Stearns; District No. 3, E. B. Guthrie; District, No. 4, Edgar Marburg; District No. 5, C. L. Strobel; District No. 6, Edward Fladd; District No. 7, A. J. Tullock.

At the meeting of Sept. 5 a paper by Mr. Ellwood Mead on "Irrigation Studies" was presented for discussion. At the meeting of Sept. 19 a paper will be presented by Mr. L. G. Montony, associate member, entitled "The Ninety-sixth Street Power Station of the Metropolitan Street Railway Company of New York City." This paper is printed in the August Proceedings.

Central Railway Club.

The next regular meeting of the club will be held on Friday, Sept. 14, 1900, at 10 a. m., at the Hotel Iroquois, Buffalo, N. Y. The Executive Committee will meet at 9 a. m. Prof. Gaetano Lanza, of the Massachusetts Institute of Technology, has accepted an invitation to read a paper upon "Efficiency Tests of Locomotives."

A Special Committee, consisting of J. A. Bradley, Chairman; T. Sills and T. Rhodes, has prepared a report giving their interpretation of the Rules of Interchange, as revised at the annual convention of the M. C. B. Association at Saratoga last June.

The following reports by special committees, submitted at the May meeting, will be discussed: "Best Form of Construction, and Methods of Ventilating, Heating and General Equipment of Roundhouses." Committee: W. H. Marshall, Chairman: George W. West, C. H. Potts. "Standard Box Cars; technical details of construction along the lines recommended by the Committee on Typical Dimensions whose report was presented at the January meeting." Committee: L. T. Canfield, H. F. Ball.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. John T. Fish died suddenly of heart disease at Milwaukee, Wis., on Aug. 28. At the time of his death Mr. Fish was the senior member of the law firm of Fish, Cary, Upham & Black, of Milwaukee, and from 1887 to 1894 he was General Solicitor of the Chicago, Milwaukee & St. Paul Ry.

—Mr. James Cullen, Superintendent of Machinery of the Nashville, Chattanooga & St. Louis Ry., died April 19. A short obituary notice of him, prepared by Mr. Pulaski Leeds, appears in the Proceedings of the Southern & Southwestern Railway Club for August. Mr. Cullen was born in Ireland in 1836, and served an apprenticeship with the Detroit Machine & Locomotive Works. His life was spent in locomotive and car shops, particularly in the South. Mr. Leeds speaks of him as having been a man of singular honesty, sincerity and fidelity to duty.

—Mr. John Edw. Battye died May 17, and an obituary notice of him appears in the August Proceedings of the Southern & Southwestern Railway Club. He was born in England in 1848, and served an apprenticeship as machinist with the Wm. Woods Machine Co. in this country. He then entered the service of the Pennsylvania Railroad Co.; was employed in various machine works; served for a time as Master Mechanic of the Shenandoah Valley R. R.; as general foreman of the locomotive department of the Roanoke shops of the Norfolk & Western, and in February, 1900, was appointed Division Master Mechanic of the Eastern Division of that road.

—Mr. W. C. Forbess, General Superintendent of the Gulf & Brazos Valley, was born in Huntingdon, Tenn., Sept. 26, 1869. He entered railroad service in 1889 as agent for the Burlington & Missouri River at Hygiene, Colo., and he served in similar capacities with the Weatherford, Mineral Wells & Northwestern and the Union Pacific, until February, 1893. He was then appointed General Freight and Passenger Agent of the Weatherford, Mineral Wells & Northwestern, which position he held until March 15, 1900, when he was appointed Chief Clerk to the General Manager of the St. Louis, Kansas City & Colorado, at St. Louis, Mo. He has held his present position of General Superintendent of the Gulf, & Brazos Valley from Aug. 15 last.

—Mr. W. S. Newhall, who, on Aug. 9, became Chief Engineer of the Wheeling & Lake Erie, was born at Germantown, Pa., May 2, 1866. He was educated at the Pennsylvania Military College. His first railroad service was with the Pennsylvania at Norristown, Pa., from Jan. 4, 1883, and he served with this company until November, 1886, as chainman, transitman, etc. He then entered the service of the Pittsburgh, Cincinnati, Chicago & St. Louis, as levelman, to July, 1888. He served in the office of the Engineer of Maintenance of Way to June, 1889, and as Assistant Engineer of the Chicago Division to July, 1891. He was then appointed Assistant Engineer of the Erie & Ashtabula Division of the Pennsylvania Company and continued in that position until June, 1893. He was Engineer of Maintenance of Way on the Toledo Division until April 1, 1895, and held a similar position on the Cleveland & Pittsburgh Division to April 1, 1900. He then resigned to engage in general contract work, which he followed until his recent appointment.

—Mr. Edward S. Washburn, President of the Kansas City, Fort Scott & Memphis, died at Rye Beach, N. H., Aug. 31. He had been ill for some time, and left his Kansas City home in June hoping to recuperate. Mr. Washburn was born at Boston, Mass., April 20, 1844. He entered railroad service as a bill clerk in the freight office of the Chicago, Burlington & Quincy, at Burlington, Ia., June 26, 1865. He continued with this company until February, 1875, serving as cashier in the local freight office at Chicago, as General Storekeeper at Aurora, Ill.; as chief clerk in the office of the Auditor and Purchasing Agent at Chicago, as private secretary to the General Superintendent, as General Agent in charge of the operating and commercial departments of the Galva & Keithsburg branch, as General Agent at Keokuk, Ia.; as Contracting Agent at Chicago, and as Assistant General Freight Agent. From February, 1875, to June 1, 1876, he was with the Michigan Central, first as agent at Chicago, and then as private secretary to the General Superintendent at Detroit, Mich. He was then made Manager of the Hoosac Tunnel Fast Freight Line at Rochester, N. Y., and in October, 1878, General Traffic Manager of the Fitchburg and the Troy & Boston roads at Boston, Mass. He was engaged in commercial business from June, 1879, to April, 1890, when he was appointed Freight Traffic Manager of the Cleveland, Cincinnati, Chicago & St. Louis. In December, 1891, he entered the service of the company of which he was President at his death, the Kansas City, Fort Scott & Memphis, as Freight Traffic Manager. He was appointed Vice-President on Jan. 1, 1896, and President in July, 1897.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—W. Gibson, heretofore General Superintendent at Pittsburgh, Pa., has been appointed Superintendent of Transportation, with headquarters at Baltimore, Md. D. F. Maroney, heretofore Superintendent of Transportation, becomes General Superintendent, with headquarters at Pittsburgh, Pa.

Boston & Maine.—C. H. Ford has assumed charge of the Car Department of the Fitchburg Division, in addition to his duties as General Foreman, with W. D. Rifenburg as his Assistant, effective Aug. 26.

Central R. R. of New Jersey.—M. M. Richey has been appointed Superintendent of Terminals, succeeding Charles A. Beach, resigned, to go with the Atlantic City, as stated Aug. 17, p. 559, effective Sept. 1.

Central Vermont.—J. A. Sheedy has been appointed Superintendent of Bridges and Buildings, with headquarters at St. Albans, Vt., succeeding J. E. Toohey, resigned.

Cincinnati Northern.—H. A. Keller has been appointed Auditor at Toledo, Ohio, succeeding W. F. Booth, resigned. Mr. Keller is succeeded by L. G. Thrall as Cashier.

Cleveland, Lorain & Wheeling.—C. C. Glessner has been appointed Auditor.

Delaware & Hudson.—Robert Rennie has been appointed Master Mechanic of the Pennsylvania Division, with headquarters at Carbondale, Pa., succeeding W. R. Johnson, resigned, effective Sept. 1.

Delaware, Lackawanna & Western.—T. E. Clarke, recently appointed Superintendent of the Main Line and Bloomsburg Division, has been appointed General Superintendent, with headquarters at Scranton, Pa., succeeding E. G. Russell, resigned, effective Sept. 1.

Great Northern.—B. F. Egan has been appointed Superintendent and F. Von Schlegell Assistant Superintendent of the Breckenridge Division, with headquarters at Breckenridge, Minn., succeeding F. J. Hawn resigned, and J. L. Forepaugh, transferred, respectively, effective Sept. 1.

Illinois Central.—The line from Mattoon to Peoria, Ill., formerly part of the Peoria, Decatur & Evansville, has, since Sept. 1, been operated by the I. C., and, together with the line from Mattoon, Ill., to Evansville, Ind., will be known as the Peoria Division. R. B. Starbuck has been appointed Superintendent, with headquarters at Mattoon, Ill. The jurisdiction of the general officers of the I. C. have been extended over the new line.

Iowa Central.—C. H. Mead has been appointed Foreman of Car Repairs.

Lehigh Valley.—George W. Seidel has been appointed Master Mechanic, with headquarters at Buffalo, N. Y., succeeding L. I. Knapp, resigned, effective Sept. 1.

Long Island.—The position of Assistant to the President, held by G. D. Pratt, has been abolished. The title of Chief Engineer has been changed to Engineer Maintenance of Way, effective Sept. 1, after which date the Comptroller, General Superintendent, Traffic Manager, Superintendent of Express, General Solicitor and the Secretary will report direct to the President, and the Superintendent of Transportation, Superintendent of Motive Power, Engineer Maintenance of Way, Superintendent of Telegraph, Superintendent of Floating Equipment, Real Estate Agent, and the Purchasing Agent will report to the General Superintendent. The General Road Master, Superintendent of Bridges and Buildings and the Principal Assistant Engineer will report to the Engineer Maintenance of Way. The Superintendent of the Atlantic Division, Train Master and the Chief Dispatcher, and all employees in the Station Department will report direct to the Superintendent of Transportation. All employees, except as otherwise directed, will report to the heads of their respective departments as heretofore.

Los Angeles & Redondo.—The officers of this company are: President and Manager, L. T. Garnsey; Vice-President, Percy T. Morgan; Secretary, Treasurer, Auditor and Assistant Manager, H. B. Ainsworth; Superintendent, L. J. Perry, and Freight Passenger Agent, J. T. Tanner.

Louisville & Nashville.—W. S. Martin, Division Superintendent at Evansville, Ind., has resigned.

Mexican National.—George J. Dwan has been appointed Assistant General Freight Agent, with headquarters at Mexico, Mex.

New York, New Haven & Hartford.—R. W. Husted, Assistant Purchasing Agent at New Haven, Conn., has resigned.

Pennsylvania Company.—W. F. Beardsley, Master Mechanic of the Northwest System at Allegheny, Pa., has been transferred to Crestline, Ohio, succeeding J. D. Harris, who has been transferred to Wellsville, Ohio, succeeding G. P. Sweeley, who, in turn, succeeds Mr. Beardsley at Allegheny, Pa.

Peoria & Pekin Terminal.—N. C. Draper, Master Mechanic, has been appointed Superintendent, succeeding M. H. Hubbell, resigned.

Rio Grande Western.—R. English, Division Master Mechanic at Helper, Utah, has resigned.

St. Louis & San Francisco.—W. P. Newton has been appointed Assistant General Auditor, effective Sept. 1.

Stillmore Air Line.—Chas. C. Brown has been appointed General Freight and Passenger Agent, with headquarters at Swainsboro, Ga., effective Sept. 1.

Toledo, St. Louis & Western.—W. F. Booth, heretofore Auditor of the Cincinnati Northern, has been appointed General Auditor of the T., St. L. & W.

Wiscasset & Quebec.—The officers of this company are: President, G. P. Farley; Vice-President, A. M. Card, and Treasurer, W. D. Patterson. (See R. R. News column.)

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

Baltimore & Ohio.—Surveys are reported in progress for a connecting line at Winchester, Va., to the Cumberland Valley.

Work is to be begun soon, according to report, in changing the line through the tunnel at Baltimore from overhead trolley to the third rail system.

Bellingham Bay & British Columbia.—A preliminary survey is reported begun for an extension east through northern Washington and over the Cascade Mountains.

Central Traction Company of Indiana.—Surveys are reported completed for this electric line from Indianapolis, Ind., north 64 miles, via Westfield, Cicero and Tipton, to Kokomo, with a branch to Elwood. It is stated that contracts are to be let early this month. Wm. L. Kann, of 717 Grant street, Pittsburgh, Pa., is President. (Construction Supplement, July 27, 1900.)

Cherry Hill, Elkton & Chesapeake.—Building was to be begun, about Sept. 1, on this line from Cherry Hill, Md., south about 15 miles via Elkton to Chesapeake City. John Kennedy, of Philadelphia, is President. Deegan & Co., Philadelphia, are interested. (Construction Supplement, July 27, 1900.)

Chicago & Northwestern.—An officer denies that plans are being made for a line from Pipestone, Minn., northeast to Beaver Falls. (Aug. 17, p. 560.)

Cleveland, Lorain & Wheeling.—An officer writes that the company has no present intention of building a cut-off between Massillon, Ohio, and Navarre. (Aug. 31, p. 588.)

Copper Range.—The company has under construction the Painesdale branch, five miles long, running from a point on the main line one mile south of Atlantic Station, Mich., to the Champion mine. In the same connection it is building spurs to the shafts of the Champion and Try Mountain mines which will aggregate 2.7 miles. The contract for grading, bridging, etc., has been let to C. J. Johnson, of Houghton, Mich., and about 200 men are employed. A portion of the line is through very difficult country, the maximum grade being 1.22 per cent. The maximum curvature is 9°. (June 29, p. 458.) There will be several high wooden trestles, but at present no steel structures. (Official.)

Denver & Rio Grande.—Work was to be begun this week on the Wet Mountain Valley extension from Texas Creek, Colo., to Silver Cliff, 26 miles. (Aug. 17, p. 560.)

Grand Forks & Kettle River.—The British Columbia Legislature has passed the bill to incorporate this company to build from Grand Forks, B. C., toward Republic, Ore. A similar bill was recently rejected by the Canadian Parliament. It is understood that the road is in the interest of the Great Northern. (Aug. 17, p. 560.)

Grand Trunk.—An officer writes that surveys have been made for a connecting line from Lynden, Ont., to a point about midway between Harrisburg and Brantford on the existing line between these two stations, about four miles. Nothing has been done as yet toward the building. (Aug. 17, p. 560.)

A dip at Port Credit, Ont., on the line between Toronto and Hamilton, is to be raised 12½ ft., including the raising of a bridge.

Hetch-Hetchy & Yosemite of California.—This company was incorporated in California, Aug. 27, with a capital stock of $1,000,000, to build a railroad from Carters, Toulumne County, northeast 75 miles through the Hetch-Hetchy Valley to the Yosemite Valley, with about 50 miles of branches. The incorporators are: Wm. R. Berry, Horatio L. Tisdale, Charles R. Lamberton, San Francisco, Cal.; Charles F. Baker and John H. Shaffer, of Oakland, Cal.

Hocking Valley.—An officer writes that there is nothing in the report that the company contemplates building a line from Wellston, Ohio, to Huntington, W. Va. (Aug. 31, p. 588.)

Lansing & Northern.—This company, whose incorporation in Michigan was recently noted, is to build an electric road from Lansing north through Dewitt, St. Johns, Alma and Ithaca to St. Louis. The incorporators are: John E. Mills, Frederick C. Norris and Edward F. Percival, all of Port Huron, Mich. This is probably the same road as that projected by the Lansing, St. Johns & St. Louis, which, it is understood, has been incorporated to build the above road. The L. & N. is incorporated under the train railway act and has power of condemnation, etc. (Aug. 17, p. 560.)

Lindsay, Bobcaygeon & Pontypool.—At the first general meeting of the stockholders, held at Lindsay, Ont., Aug. 27, the company was organized and arrangements made for the immediate building of the road. The preliminary work is to be begun at once. The line, about 40 miles long, is projected in Ontario to connect the three cities named. W. C. T. Boyd, of Bobcaygeon, is interested. (Construction Supplement, July 27, 1900.)

Los Angeles Terminal.—Frederick K. Rule, General Manager at Los Angeles, announces that surveys are in progress for the extension of the line from Los Angeles, Cal., east 60 miles to San Bernardino. From thence the road is to be continued to Salt Lake City, Utah, in all 400 miles. A half interest was recently acquired by Senator W. A. Clark, of Montana. (Railroad News, Aug. 31, p. 588.)

Louisville & Atlantic.—This company, successor to the Richmond, Nicholasville, Irvine & Beattyville, is building an extension from Irvine, Ky., east along the Kentucky River 35 miles to Beattyville. There is an old grade of 18 miles, of which the company is completing the first six miles out from Irvine to the mouth of Miller's Creek, to give an outlet to logs floated down the Kentucky River, and also for iron ore, tan bark, timber, etc. There are about 75 men at work and the company expects to finish the six miles before December. The remaining 12 miles of the old grade are to be completed by the company's forces. The 17 miles upon which no work has been done will require a tunnel through solid rock of 4,700 cu. yds. excavation. There will also be a number of trestles running across branches entering the Kentucky River. These must be above the high water line of the river, which occasionally rises as high as 50 ft. This work will probably be re-located on the old line and let to contractors to begin work in the early spring. The company's old line extends from Versailles, Ky., on the Southern Ry., southeast 61 miles to Irvine. The new connecting link will carry the road to Beattyville, where the company owns five miles of line known as the Beattyville & Cumberland Gap, which is connected with the Lexington & Eastern, in all, when completed, 101 miles. It is also proposed to extend the line to a connection with one of the lines running to Norfolk or Charleston, which will require about 80 miles additional. The company wants at once 100 to 600 tons of 60-lb. relaying rails, and will soon require a steam shovel and pile driver for the section now in progress. The maximum grades are 60 ft. to the mile, and the maximum curves 10°. The line taps valuable coal and timber tracts. (Official.)

Louisville & Nashville.—An officer denies the truth of the report that a two-mile spur is to be built to the mines of the Anniston Brown Ore Co., Alexandria, Ala. (Aug. 24, p. 574.)

Missouri, Kansas & Texas.—The City of New Braunfels, Tex., has agreed to give a bonus of $30,000 for the extension from San Marcos, southwest about 30 miles through that city to San Antonio. (Construction Supplement, July 27, 1900.)

Nashville & Knoxville.—The contract is reported let for a branch from Monterey, Tenn., northeast 16 miles to Hanging Limb.

Natchez, Ball & Shreveport.—This company has been organized at Alexandria, La., with a capital stock of $500,000, to build a line from Natchez, Miss., across the Mississippi, and west about 60 miles to Ball, near Alexandria, and thence about 110 miles more to Shreveport. C. E. Ball is President and General Manager. James F. Ball, Vice-President, and John W. Ball, Secretary and Treasurer. The principal office is Alexandria.

North Carolina Roads.—The Eureka Lumber Co. is reported building a line from Marble to timber lands, about 10 miles. Chas. Cushing, of Hot Springs, N. C., is Engineer.

Nunnundah.—This company was incorporated in Pennsylvania, Aug. 22, with a capital stock of $25,000, to build a line 10 miles long, from Eldred, McKeen County, to a point on the New York state line, connecting with the Western New York & Pennsylvania. Sheridan Garten, of Smethport, Pa., is President.

Ohio Valley Electric.—Building is practically completed on this electric line, whose incorporation was recently noted, from Huntington, W. Va., northwest through Kentucky to Ironton, Ohio. W. W. Magoon, Huntington, W. Va., is General Manager. J. N. Camden, Parkersburg, W. Va., is the principal promoter. (Aug. 24, p. 574.)

Oregon Midland.—John Hale, of Portland, Ore., has taken the contract for 66 miles of the total 84 miles of this line from Klamath Falls, Ore., southwest to Klamathon, Cal., near the state line. The Midland Construction Co., of Ashland, Ore., has the general contract. L. W. Van Horn, of Ashland, is Vice-President and General Manager. (Aug. 17, p. 560.)

Oregon Railroad & Navigation.—The section from mile post 66 in Oregon, east of Hood River, to mile post 77, through the Columbia River Canyon, is being rebuilt. The company is rectifying the alignment by cutting out excessive curvature and eliminating all wooden structures. (Aug. 17, p. 560.) This is simply a continuation of the same character of work that has been done for the past three years along the Columbia River. (Official.)

Rio Grande Western.—Grading is reported begun on a cut-off at Roy, Utah, 7½ miles from Ogden, which is to lower the track several feet.

San Francisco & Clear Lake.—This company has been organized in California to connect Clear Lake with San Francisco. It is proposed to build a line from Lower Lake, at the south end of Clear Lake, to run south about 60 miles to Vallejo, on San Pablo Bay, thence a line of steamers will connect through San Francisco Bay to San Francisco. W. B. King, of San Francisco, and Rev. Richard Wilie, of Napa, are interested.

Seaboard Air Line.—An officer denies the report of preliminary surveys by this company for a line from Greenville, S. C., to Athens, Ga. (Aug. 24, p. 574.)

Southern Pacific.—Surveys are reported in progress for a cut-off near Wells, Nev., to reduce the grade on Moore's Hill. The company is also reported laying 30 miles of 90-lb. rails west of Wells.

Terre Haute & Wabash Valley.—This new line, recently incorporated, is to run from Terre Haute, Ind., southwest 31 miles. It will pass through a level country and will require three bridges, 70, 76 and 80 ft. respectively. The line is to be run by electricity and will require 60-lb. rails. (Aug. 24, p. 574.) J. R. Kendall, Terre Haute, Ind., is President, and George Grimes, Engineer. (Official.)

Toledo, St. Louis & Western.—This company, successor to the Toledo, St. Louis & Kansas City, contemplates making improvements on the line, but details have not as yet been prepared. (Official.)

Union Pacific.—An officer writes that there is nothing in the report that the company will build a cut-off about five miles long at Fort Steel, Wyo. (Aug. 17, p. 560.)

GENERAL RAILROAD NEWS.

Baltimore & Ohio.—The company has filed an answer to the suit of the State of Maryland to enforce the payment of dividends on the stock of the Washington Branch, and for distribution of $914,707.58 claimed as due to the stockholders. The company states that whatever surplus there is resulting from operations is being held to pay for the company's share of the terminal improvements at Washington, D. C. The total estimated cost of these terminals is $5,599,408, of which the United States and the District of Columbia will pay $1,500,000. The Washington Branch Co. under its charter is not permitted to increase its bonded indebtedness. (July 6, p. 472.)

Chicago, Milwaukee & St. Paul.—The company is reported to have obtained a 100-year lease of trackage rights into Duluth over the St. Paul & Duluth from the Northern Pacific Co.

Chicago, Peoria & St. Louis.—The receivers have filed in the United States Circuit Court, at Springfield, Ill., a report covering the period of the receivership from July 19, 1898, to Feb. 28, 1900, the date when the property was practically turned over to the new company. It shows gross earnings of $1,606,791 and operating expenses of $1,262,486, making the net earnings $344,305. After adding the receipts from other sources and deducting taxes, interest and improvements, there is a surplus of $288,514. (July 6, p. 472.)

East Shore Terminal.—The purchase of this property is reported completed by the Southern Ry., the Plant System and the Atlantic Coast Line, and the property is to be operated jointly by these companies. (Dec. 29, 1899, p. 902.)

Galveston & Western.—The Southern Pacific is reported to have obtained control of this property, which has terminal facilities at Galveston, Tex.

Mexican Central.—Thirty-five 5 per cent. equipment and collateral gold bonds, due 1919, have been drawn for payment at the Old Colony Trust Co., Boston, Oct. 1. (May 18, 1900, p. 330.)

Missouri Pacific.—Holders of 5 per cent. gold funding notes of March 1, 1895, are notified that these will be paid at the office of the Mercantile Trust Co., New York, at par and accrued interest on Oct. 1.

Moore County & Western.—The principal of the $350,000 bonds which matured March 1, 1900, and was extended by consent of the bondholders for six months, will not be paid, so it is stated. Neither will the interest be met which was due Sept. 1. Bondholders are requested to communicate with J. F. Lisman & Co., 30 Broad street, with a view to protecting their interests. The road runs from Aberdeen, N. C., to Craigrownie, 12½ miles.

New Orleans & Western.—The foreclosure sale has been fixed for Oct. 6 at Port Chalamette, La. The upset price is $1,000,000. The claims consist of $400,000 receivers' certificates and about $125,000 of open accounts, etc. The balance remaining from the sale is to be distributed pro rata among the $2,000,000 first mortgage bonds. These bonds have accrued interest of $333,125. (Aug. 10, p. 546.)

Tacoma & Columbia River.—Judge Hanford, of the U. S. Court, at Tacoma, Wash., Aug. 29, ordered the sale of this property to be made after 30 days' advertising. The upset price is $11,000. The claims aggregate about $520,000. The road is projected from Tacoma, Wash., to The Dalles, Ore., 145 miles, of which 13.5 miles is completed. (April 14, 1899, p. 274.)

Texas & New Orleans (Southern Pacific).—The Texas State Railroad Commission has authorized the issue of $4,435,200 bonds at $20,000 per mile upon the following roads: Extension from Rockland, Tex., to Cedar, 165 miles (building); old Texas Trunk, 50.58 miles, and Louisiana Western extension, 6.18 miles. The issues on the last two named were under the provision of the consolidation act whereby the roads are to retire their outstanding indebtedness. (Aug. 3, p. 532.)

Union Terminal.—This company has notified the Great Northern that the present leases of the terminal property at Sioux City, Iowa, which are about to expire, will not be renewed. The Illinois Central also uses the terminals.

Wiscasset & Quebec.—The bondholders, on Aug. 27, at Wiscasset, Me., took control of this property. The company has been reorganized. (Aug. 24, p. 574.)